DOCUMENT RESUME

ED 342 643	SE 052 428

AUTHOR	Pfundt, Helga; Duit, Reinders
TITLE	Students' Alternative Frameworks and Science Education. Bibliography. 3rd Edition. IPN Reports-in-Brief = Alltagsvorstellungen und Naturwissenschaftlicher Unterricht. Bibliographie. 3. Auflage. IPN-Kurzberichte.
INSTITUTION	Kiel Univ. (West Germany). Institut fuer die Paedagogik der Naturwissenschaften.
PUB DATE	91
NOTE	317p.; For the second edition, see ED 315 266.
AVAILABLE FROM	Institut fuer die Paedagogik der Naturwissenschaften an der Universitaet Kiel, Olshausenstrabe 62, D-2300 Kiel 1, Germany.
PUB TYPE	Reference Materials - Bibliographies (131)
LANGUAGE	German; English
EDRS PRICE	MF01/PC13 Plus Postage.
DESCRIPTORS	Biology; Chemistry; Cognitive Development; *Concept Formation; Elementary Secondary Education; Foreign Countries; Higher Education; Learning Processes; *Misconceptions; Physics; Science and Society; Science Education; Sex Differences; Teacher Education; Teaching Methods
IDENTIFIERS	Constructivist Learning

ABSTRACT

This bibliography contains some 2,000 articles on empirical investigation and theoretical considerations covering the topic of students' conceptions entered before September 1990. PUblications in journals, books, working papers, and contributions to conferences are included. English, German, and French publications, and ones in other languages are contained in the bibliography. The bibliography is divided into nine groups: (1) general considerations concerning research in this area; (2) everyday notions and scientific notions; (3) development of notions in the history of science as compared to development of notions of individuals; (4) language and notions; (5) methods of investigations; (6) investigations of students' notions; (7) instruction taking students' notions into account; (8) investigations of teachers notions; and (9) notions and teacher training. The entries include the author's name, year of publication, title, place of publication, and a set of keywords that help the reader to categorize the articles. Keywords indicate the group of the article (1-9), physics, chemistry, or biology, and further areas or concepts. Articles dealing with conceptions of the teaching and learning process, conceptions of science, conceptions on the use of science for technology and society, and empirical studies in which gender differences are investigated are also indicated by keywords. An author index, an appendix that contains publications added during the preparation of the present edition from October to December 1990, a second appendix that contains entries from another bibliography not listed in this bibliography, and a list of keywords are included. (KR)

ED342643

Institute for Science Education
Institut für die Pädagogik der Naturwissenschaften

Helga Pfundt / Reinders Duit

Bibliography
Students' Alternative Frameworks and Science Education

Bibliographie
Alltagsvorstellungen und naturwissenschaftlicher Unterricht

3rd Edition / 3. Auflage

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Dr. T. Kapune

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it
☐ Minor changes have been made to improve reproduction quality
● Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

SE 052428

BEST COPY AVAILABLE

2

IPN Reports-in-Brief
IPN-Kurzberichte

Helga Pfundt / Reinders Duit

Bibliography
Students' Alternative Frameworks and Science Education

Bibliographie
Alltagsvorstellungen und naturwissenschaftlicher Unterricht

3rd Edition / 3. Auflage

Helga Pfundt / Reinders Duit

Bibliography
Students' Alternative Frameworks and Science Education

Bibliographie
Alltagsvorstellungen und naturwissenschaftlicher Unterricht

3rd Edition / 3. Auflage

INSTITUTE FOR SCIENCE EDUCATION
INSTITUT FÜR DIE PÄDAGOGIK DER NATURWISSENSCHAFTEN
AN DER UNIVERSITÄT KIEL

IPN

Heinrich Stork, *Geschäftsführender Direktor*
Horst Bayrhuber, *Direktor am Institut*
Thorsten Kapune, *Leiter der Zentralabteilung*
Walter Westphal, *Direktor am Institut*

Lore Hoffmann,
Vorsitzende des Wissenschaftsausschusses

1991 · Institut für die Pädagogik der Naturwissenschaften
an der Universität Kiel
(Institute for Science Education)
Olshausenstraße 62
D-2300 Kiel 1
Federal Republic of Germany

Permission for reprinting (including excerpts) can be obtained from the Institute.

Nachdruckgenehmigung – auch für Auszüge – kann beim Institut eingeholt werden.

VORWORT

Das Forschungsgebiet, das sich mit "Schülervorstellungen" und ihrer Rolle für den naturwissenschaftlichen Unterricht befaßt, zählt nach wie vor zu den aktivsten im Bereich naturwissenschaftsdidaktischer Forschung. Die erste Auflage der Bibliographie "Alltagsvorstellungen und naturwissenschaftlicher Unterricht" (1985) enthielt etwa 700 Einträge, bei der zweiten Auflage (1988) waren es bereits doppelt so viele, die vorliegende dritte Auflage enthält über 2.000.

Der Titel der Bibliographie "Alltagsvorstellungen und naturwissenschaftlicher Unterricht" erklärt sich aus der Geschichte des Arbeitsgebietes. Er ist heute nur noch bedingt zutreffend. Zwar beschäftigen sich nach wie vor die meisten Arbeiten mit der Untersuchung von Schülervorstellungen zu Phänomenen, Begriffen und Prinzipien, von denen im naturwissenschaftlichen Unterricht die Rede ist. Viele dieser Vorstellungen sind Alltagsvorstellungen, d. h. sie beruhen auf Alltagserfahrungen im Umgang mit Phänomenen und auf alltäglichen Spracherfahrungen. Aber es werden auch zunehmend Vorstellungen allgemeinerer Art (z. B. zur Natur und Reichweite naturwissenschaftlichen Wissens oder zum Lernprozeß) in die Analyse von Lernschwierigkeiten und in die Entwicklung von neuen Unterrichtsansätzen zu ihrer Überwindung einbezogen. Die konstruktivistische Sichtweise ist die Klammer, die diese unterschiedlichen Vorstellungen verbindet. Es wird auch die Beschränkung auf Schülervorstellungen aufgegeben. Die Rolle von Lehrervorstellungen (ganz allgemeiner Art) wird zunehmend als eine Ursache vieler Lernschwierigkeiten erkannt.

Die Bibliographie basiert auf einer Literatursammlung, die Helga Pfundt vor etwa 15 Jahren begonnen hatte. Sie wird seit ihrem frühen Tod im Oktober 1984 von mir fortgeführt. Ich bemühe mich, in der Bibliographie die wichtigsten empirischen Untersuchungen und theoretischen Ansätze zu diskutieren, die im Gebiet der empirischen "konstruktivistisch" orientierten Naturwissenschaftsdidaktik publiziert werden. Dies schließt "offizielle" Publikationen und "graue" Materialien ein. Ich sehe die wichtigsten deutsch- und englischsprachigen Fachzeitschriften systematisch durch. Darüber hinaus versuche ich Tagungsbände, Bücher und dergleichen möglichst umfassend auszuwerten und in Tagungsprogrammen Beiträge zum Thema zu finden. Eine weitere wichtige Informationsquelle sind die Newsletter zweier informeller Zusammenschlüsse von Forschern auf dem hier dokumentierten Gebiet (siehe dazu S. xvii). Viele Kollegen schicken mir von sich aus ihre neuen Arbeiten zu. Ihnen sei herzlich gedankt.

Es gibt eine Reihe weiterer Bibliographien zum Thema der hier vorliegenden (s. S. xvii). Ich habe die dort aufgeführten Publikationen nach Möglichkeit in die vorliegende Bibliographie (bzw. in die Anhänge 1 und 2) aufgenommen.

Ich schulde Dank vielen Kollegen im IPN. Werner Dierks hat mich mit Informationen vor allem zu Artikeln aus dem Bereich der Chemie versorgt. Hans-Jürgen Waldow hat es ermöglicht Daten, die bislang auf einem größeren Computer gespeichert waren, auf meinen PC zu übertragen. Hans Dörr und Renate Meyer haben die bisherigen Auflagen betreut und die Eingaben der bis dahin aufgelaufenen Artikel übernommen. Martin Vaterodt hat dies für die vorliegende Auflage besorgt. Er hat dabei auch viele Fehler beseitigt, die in den beiden vorangegangenen Auflagen noch vorhanden waren. Ohne seine sorgfältige Arbeit wäre die dritte Auflage nicht zustande gekommen.

Reinders Duit, Dezember 1990

Adresse: Reinders Duit
IPN - Institut für die Pädagogik
der Naturwissenschaften an der
Universität Kiel
Olshausenstr. 62

D 2300 Kiel 1

Tel.: 0431 880 3145
Fax.: 0431 880 1521

FOREWORD

Research on "Students' alternative frameworks" is still flourishing. The first edition of the bibliography (1985) contained some 700 quotations, the second edition (1988) some 1400, and the present third edition arrived at more than 2000.

It has become somewhat misleading to indicate the research field presented in the bibliography using labels like "Students' alternative frameworks". The term alternative framework coined by Driver & Easley (cf. gi, p. 8) originally focused on students' alternative conceptions (as opposed to science conceptions) of phenomena concepts and principles taught in science instruction, i.e. on conceptions at the content level. There are currently strong trends in the direction of considering "alternative frameworks" of a much broader kind (e.g. including conceptions of the nature and range of science, conceptions of the learning process, and teachers' conceptions of various kinds). This research is carried out within what is called the constructivist view. The bibliography may therefore now be viewed as an attempt to document constructivist research in science education.

The bibliography is based on a collection of papers Helga Pfundt started some fifteen years ago. Sadly Helga Pfundt died in October 1984. Since then I have taken care of the bibliography. I include articles on empirical investigations and theoretical considerations. Both publications in journals, books and the like and working papers, contributions to conferences etc. I analyze the leading English and German journals in the field of science education, books in our area and conference programs. Publications in other languages are also contained in the bibliography, especially publications in French, but they are more incidental. Other important sources of information are the newsletters of two informal groups of researchers in our field (cf. p. xvii). Further, many colleagues have been so kind as to send their recent articles and papers. I am most grateful for their help.

There are some other bibliographies on research on students' conceptions available (cf. p. xvii). As far as possible I have included quotations from them in the present third edition of my bibliography.

Many people were involved in work on the bibliography. Werner Dierks provided me with information mainly on research in the field of chemistry. Hans-Jürgen Waldow made it possible to transfer the data which had so far been stored on a main frame computer to a PC. Hans Dörr and Renate Mayer were responsible for the first and second edition of the bibliography. Martin Vaterodt was responsible for the third edition. Not only did he carefully deal with new contributions, he also removed many mistakes that had survived in the first and second editions during the past few years. Without his careful work there would not be a third edition.

Reinders Duit, December 1990

Address: Reinders Duit
IPN - Institute for Science Education
at the University of Kiel
Olshausenstr. 62
D-2300 Kiel 1
Germany

Tel.: 49 431 880 3145
Fax: 49 431 880 1521

INHALTSVERZEICHNIS	TABLE OF CONTENTS	SEITE/ PAGE
Einführung	Introduction	xi xxvii
Bibliographie Liste der Publikationen (s. Details unten)	**Bibliography** List of publications (see details below)	1
Autorenverzeichnis	**Authors' index**	217
Anhang 1 (Liste von Publikationen Okt. bis Dez. 90)	**Appendix 2** (List of publications Oct. to Dec.90)	235
Anhang 2 (Liste weiterer Publikationen)	**Appendix 2** (List of further publications)	245
Liste der Schlagwörter	**List of keywords**	269

BIBLIOGRAPHIE **Liste der Publikationen**	**BIBLIOGRAPHY** **Lists of publications**	
g1 Zum Umfeld des Problems "Vorstellungen der Schüler"	g1 General considerations concerning research in this area	2
g2 Alltagsvorstellungen und wissenschaftliche Vorstellungen	g2 Everyday notions and scientific notions	37
g3 Geschichtliche und individuelle Entwicklung von Vorstellungen	g3 Development of notions in the history of science as compared to development of notions in individuals	39
g4 Sprache und Vorstellungen	g4 Language and notions	42
g5 Methoden zur Erfassung von Vorstellungen	g5 Methods to investigate notions	49

BIBLIOGRAPHIE Liste der Publikationen	BIBLIOGRAPHY Lists of publications	
g6 Untersuchungen zu Vorstellungen von Schülern und Studenten	g6 Investigations of students' notions	
Bereich der Physik	*Area of physics*	
- Elektrizität	- electricity	66
- Wärme	- heat	78
- Mechanik	- mechanics	84
- Optik	- optics	104
- Atome/Teilchen	- atoms/particles	110
- Astronomie	- astronomy	115
- Energie	- energy	118
- Sonstige	- others	123
Bereich der Chemie	*Area of chemistry*	129
Bereich der Biologie	*Area of biology*	139
Sonstige	*Others*	154
g7 Unterricht unter Berücksichtigung von Vorstellungen der Schüler	g7 Instruction taking students' notions into account	
Bereich der Physik	*Area of physics*	
- Elektrizität	- electricity	164
- Wärme	- heat	168
- Mechanik	- mechanics	170
- Optik	- optics	176
- Atome/Teilchen	- atoms/particles	178
- Astronomie	- astronomy	180
- Energie	- energy	181
- Sonstige	- others	183
Bereich der Chemie	*Area of chemistry*	185
Bereich der Biologie	*Area of biology*	187
Sonstige	*Others*	189
g8 Untersuchungen zu Vorstellungen von Lehrern	g8 Investigations of teachers' notions	196
g9 Vorstellungen und Lehrerbildung	g9 Notions and teacher training	202
CTL Untersuchungen zu Vorstellungen des Lehr- und Lernprozesses	CTL Studies investigating conceptions of teaching and learning	205
CSC Untersuchungen von Vorstellungen über die "Natur" der Wissenschaften	CSC Studies investigating conceptions of science	209
STS Untersuchungen zu Vorstellungen vom Nutzen naturwissenschaftlicher Kenntnisse in Technik und Gesellschaft	STS Studies investigating conceptions of the use of science for technology and society	212
GEN Untersuchungen, in denen geschlechtsspezifische Unterschiede erforscht werden	GEN Studies in which gender differences are investigated	214

Reinders Duit: EINFÜHRUNG

(1) ZUM UMGANG MIT DER BIBLIOGRAPHIE

Zu den Zielen der Literatursammlung

Dem Forschungsgebiet "Alltagsvorstellungen und naturwissenschaftlicher Unterricht" wird seit etwa der Mitte der 70er Jahre große Aufmerksamkeit gewidmet. Wir haben die Literatursammlung, die der vorliegenden Bibliographie zugrunde liegt, ursprünglich angelegt, um einen Überblick über das Forschungsfeld zu bekommen, d. h. um uns dort einzuarbeiten. Im Laufe der Zeit hat sich die heutige Literatursammlung ergeben. Sie hilft uns, einen Überblick über die immer noch schnell wachsende Zahl von Forschungsarbeiten zu behalten. Durch die Publikation der vorliegenden Bibliographie hoffen wir, interessierten Kollegen ebenfalls einen Überblick zu ermöglichen. Mit dieser Publikation verbinden wir die folgende Bitte:

Bitte schicken Sie uns Ihren neuen Artikel oder Arbeiten, die wir bislang noch nicht aufgenommen haben, insbesondere dann, wenn es sich um Arbeiten handelt, die nicht in leicht zugänglichen Publikationen (wie Zeitschriften, Sammelbänden und dergleichen) erschienen sind. Wir werden die Beiträge aufnehmen und in einer Ergänzungsliste oder einer Neuauflage berücksichtigen.

Leider müssen wir den folgenden Hinweis geben:

Zwar steht unsere Literatursammlung allen Kollegen offen, die uns am IPN besuchen. Es ist uns aber nicht möglich, Kopien von Publikationen anzufertigen, die in unserer Liste genannt sind. Bitte wenden Sie sich diesbezüglich immer an die Autoren!

Zu den Schwerpunkten der Bibliographie

Der Schwerpunkt der Bibliographie liegt auf den naturwissenschaftlichen Fächern Biologie, Chemie und Physik. Da im angelsächsischen Bereich auch "earth science" zu "science" zählt, enthält die Bibliographie auch Arbeiten dieser Ausrichtung. Sie werden aber nicht gesondert ausgewiesen. Sie finden sich jeweils in den Gruppen g6, g7 und g8 unter "Sonstige". Untersuchungen zu "Vorstellungen" und ihrer Bedeutung für den Lernprozeß gibt es auch in anderen Fächern. Insbesondere die Mathematik ist dabei zu erwähnen. Die folgenden Tagungsbände geben einen ersten orientierenden Überblick:

Archenhold, W. F., Orton, A., Driver, R., Wood-Robinson, C., Eds. (1980). Cognitive Development. Research in Science and Mathematics. Proceedings of an International Seminar. Leeds: The University of Leeds

Helm, H., Novak, J., Eds. (1983). Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca: Cornell University

Novak J., Ed. (1987). Proceedings of the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol. I, II, III. Ithaca: Cornell University

Leider ist es bislang noch nicht zu einem engeren Meinungs- und Erfahrungsaustausch zwischen Naturwissenschaftsdidaktikern und Mathematikdidaktikern über die jeweiligen empirischen Ergebnisse und theoretischen Ansätze gekommen.

Zum Aufbau der Literaturliste

Wir haben die aufgenommenen Arbeiten in neun Gruppen eingeteilt:

g1 Zum Umfeld des Problems "Vorstellungen"

Hier finden sich Arbeiten, die sich ganz allgemein mit Problemen des Forschungsgebietes befassen.

g2 Alltagsvorstellungen und wissenschaftliche Vorstellungen

Es geht in dieser Gruppe um Arbeiten, die sich speziell mit der Frage der Beziehungen zwischen Alltagsvorstellungen und wissenschaftlichen Vorstellungen beschäftigen.

g3 Geschichtliche und individuelle Entwicklung von Vorstellungen

Viele Untersuchungen zeigen, daß bei Schülern/Studenten heute Vorstellungen auftreten, die auch in der historischen Entwicklung der Wissenschaft eine Rolle gespielt haben. Die hier eingeordneten Arbeiten gehen der Frage nach, welche Bedeutung die historische Entwicklung für die individuelle Entwicklung haben kann.

g4 Sprache und Vorstellungen

Viele Vorstellungen haben ihren Ursprung in der Alltagssprache. Um diesen Problemkreis geht es hier.

g5 Methoden zur Erfassung von Vorstellungen

Wir haben hier solche Publikationen eingeordnet, die Untersuchungsmethoden diskutieren.

g6 Untersuchungen zu Vorstellungen von Schülern und Studenten

Dies ist die umfangreichste Gruppe. Nach Sachgebieten geordnet (s. weiter unten) finden sich hier Arbeiten, die Auskunft über Vorstellungen in verschiedenen Bereichen geben.

g7 Unterricht unter Berücksichtigung von Vorstellungen der Schüler

Es finden sich hier Untersuchungen, in denen Unterricht, der Schülervorstellungen explizit berücksichtigt, im Mittelpunkt steht. Auch hier werden die Arbeiten nach Sachgebieten geordnet.

g8 Untersuchungen zu Vorstellungen von Lehrern

Entsprechend wie bei g6 werden hier Vorstellungen von Lehrern eingeordnet. Die Unterscheidung von Lehrern auf der einen und Schülern/Studenten auf der anderen Seite ist nicht immer ganz einfach. In der Literatur wird zum Beispiel manchmal auch dann bereits von Lehrervorstellungen gesprochen, wenn es sich um Lehrerstudenten in der berufsvorbereitenden Phase ihrer Ausbildung handelt. In der vorliegenden Bibliographie werden unter g8 nur Untersuchungen zu Vorstellungen praktizierender Lehrer aufgelistet.

g9 Vorstellungen und Lehrerbildung

Es geht hier um Konsequenzen, die aus den empirischen Untersuchungen und theoretischen Überlegungen für die Lehrerbildung gezogen werden. Eingeordnet werden hier solche Arbeiten, in denen entweder neue Konzepte für die Lehrerbildung auf einer "konstruktivistischen" Basis entwickelt werden oder in denen über die Erprobung solcher Ansätze berichtet wird.

Die Zuordnung von Beiträgen zu den einzelnen Gruppen ist nicht immer einfach. Wir hoffen aber in den meisten Fällen eine einigermaßen einleuchtende Zuordnung gefunden zu haben. Viele Beiträge sind in verschiedene Gruppen eingeordnet. Man erkennt dies bei den Zitaten daran, daß mehrere Schlagwörter (s. weiter unten) angegeben sind. Bei einem Forschungsfeld, das sich nach wie vor in der Entwicklung befindet, ist es sehr schwierig, ein Kategoriensystem zu finden, das für alle Entwicklungen offen ist, das sozusagen ohne Schwierigkeiten mitwächst. Das vorstehend skizzierte Kategoriensystem der Gruppen g1 bis g9 erwies sich Anfang der 80er Jahre als zweckmäßig. Neuere Entwicklungen im Forschungsfeld würden heute wohl zu einem etwas anderen System führen, wenn man es ganz neu entwerfen würde. Durch Ergänzungen aber versuchen wir, das System so zu erweitern, daß es jedenfalls den wichtigsten Aspekten auch des heutigen Forschungsstandes gerecht werden kann.

Ergänzungen des Kategoriensystems erscheinen insbesondere in g1 nötig zu sein. Eingeordnet sind dort 668 Arbeiten verschiedener Ausrichtung und Schwerpunkte. Die Auswertung dieser vielen Arbeiten würde durch entsprechend gewählte weitere Schlagwörter sehr vereinfacht. Leider war es mir bislang nicht möglich, eine solche weitere Verschlagwortung vorzunehmen. Ergänzungen wären auch für die Bereiche Biologie und Chemie in g6 und g7 nötig. Hier fehlt bislang eine Aufteilung in Sachbereiche, wie sie für die Physik bereits vorliegt. Aber auch dort erscheinen weitere Unterteilungen notwendig zu sein. Dies gilt insbesondere für die 281 Arbeiten, die der Mechanik zugeordnet sind.

Schlagwörter

Die "Schlagwörter" g1 bis g9 kennzeichnen die vorstehend genannten neun Gruppen.

Für Arbeiten, die in die Gruppen g6, g7 und g8 eingeordnet sind, geben wir weitere Schlagwörter an. Diese betreffen zunächst die Fächer:

P: Physik
C: Chemie
B: Biologie

Findet sich bei den Publikationen der Gruppen g6, g7 und g8 keines dieser Schlagwörter, so handelt es sich entweder um eine Arbeit, in der Vorstellungen aller drei Fächer gleichermaßen eine Rolle spielen oder um eine Arbeit, die sich nicht speziell mit Vorstellungen eines der Fächer beschäftigt. Zu letzteren Arbeiten zählen z. B. solche, die sich mit übergreifenden Denkschemata, wie z. B. Kausalität, Reversibilität, Erhaltung oder Proportionalität, befassen.

Da die Anzahl der zur Physik erschienenen Arbeiten fast unüberschaubar groß geworden ist, haben wir dort die folgenden weiteren Untergliederungen vorgenommen.

E: Elektrizität
T: Wärme (Therm. Physik)
M: Mechanik (einschließlich der Mechanik der Flüssigkeiten und Gase sowie der Aggregatzustandsänderungen)
O: Optik
AT: Atome und Teilchen
AS: Astronomie (insbesondere Vorstellungen über die Erde und andere Himmelskörper im Weltall)
EN: Energie

Alle Arbeiten zur Physik, die nicht in diese Teilgebiete eingeordnet worden sind, erscheinen unter "g6, P (sonstige/others)". Um allzuviele Überschneidungen zwischen Chemie und Physik zu vermeiden, ordnen wir Untersuchungen zu Teilchen- und Atomvorstellungen der Physik zu und nicht auch noch der Chemie. Einige weitere Schlagwörter zum Bereich Physik kennzeichnen weitere Gebiete bzw. Begriffe. Sie spiegeln weniger eine Systematik als vielmehr die Interessen der Ersteller der Bibliographie.

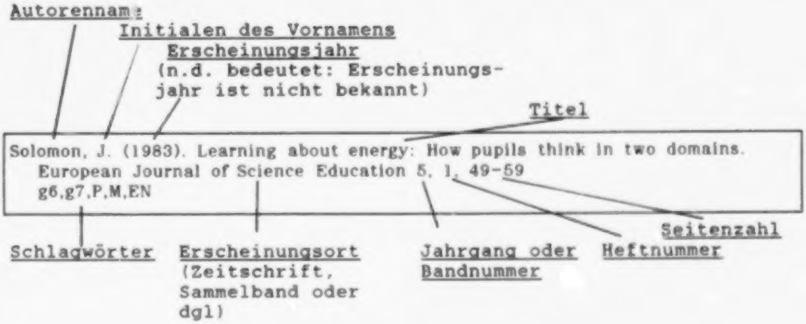
ENT: Entropie
FLD: Feld
INF: Information
IRR: Irreversibilität
MAG: Magnetismus
Q: Quantenphysik
R: Relativistische Physik
STAT: Statistische Physik
S: Schall

Weitere allgemeine Schlagwörter beziehen sich auf alle Arbeiten, die in die Gruppen g6, g7 und g8 eingeordnet werden.

CTL: Vorstellungen (Konzeptionen) des Lehr- und Lernprozesses. Dieses Schlagwort kennzeichnet empirische Untersuchungen zu Vorstellungen (von Schülern/Studenten bzw. Lehrern) zum Lehren und Lernen.
CSC: Vorstellungen (Konzeptionen) zur "Natur" der Wissenschaften. Erfaßt werden hier empirische Untersuchungen zu Vorstellungen von der "Natur und Reichweite" naturwissenschaftlicher Theorien und Erkenntnisse.
STS: Vorstellungen zum Nutzen naturwissenschaftlicher Kenntnisse und Verfahrensweisen im Raum der Technik und der Gesellschaft
GEN: Dieses Schlagwort kennzeichnet empirische Untersuchungen, in denen geschlechtsspezifische Unterschiede eine Rolle spielen.
OCI: Der Beitrag enthält Originalzitate aus Interviews oder Fragebögen
OIM: Der Beitrag enthält Originalzeichnungen der Befragten

Am Ende dieses Bandes findet sich eine Liste aller Schlagwörter.

Erläuterung der Zitate


Autorenname
Initialen des Vornamens
Erscheinungsjahr
(n.d. bedeutet: Erscheinungsjahr ist nicht bekannt)
Titel
Seitenzahl
Schlagwörter
Erscheinungsort (Zeitschrift, Sammelband oder dgl)
Jahrgang oder Bandnummer
Heftnummer

Solomon, J. (1983). Learning about energy: How pupils think in two domains.
European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Dateien der Bibliographie auf Computerdiskette

Die Bibliographie wird mit Hilfe des Literaturverwaltungsprogramms "Turbo Lit" (Version 3.1.) der Firma M. Krauss & W. Benner (Mauritiusstr. 15/ D 5403 Mülheim-Kärlich) geführt. Falls Kollegen über dieses Programm verfügen, kann der Datensatz auf Computerdiskette bereitgestellt werden. Für Kollegen, die ein anderes Verwaltungsprogramm benutzen, kann der Datensatz als ASCII Datei oder als WORD Datei (für IBM kompatible Rechner) auf Disketten überspielt werden, die mir zugesandt werden. Auf diesen Dateien werden die Einträge in alphabetischer Reihenfolge (nach dem Namen des ersten Autors) in der vorstehend erläuterten Form aufgelistet. Sie lassen sich von diesen Dateien in vorhandene Literaturverwaltungssysteme transformieren. Der gesamte Datensatz hat etwa 400kB. Falls die Disketten mit 360kB formatiert sind, müssen deshalb zwei Disketten geschickt werden.

(2) ZUM FORSCHUNGSGEBIET

Informelle Zusammenschlüsse

Das Forschungsgebiet, auf das sich die hier vorliegende Bibliographie bezieht ist sehr gut ausgebaut. Es dürfte sich um das Gebiet handeln, auf dem die meisten naturwissenschaftsdidaktischen Forschungsarbeiten entstehen. Die Anzahl der Kolleginnen und Kollegen, die auf diesem Gebiet arbeiten, ist schwer einzuschätzen. Es gibt zwei weltweit operierende informelle Zusammenschlüsse, deren Mitgliederlisten etwa 500 Personen umfassen. Es handelt sich dabei um:

(a) Eine auf "privater" Basis operierende Gruppe nennt sich "Invisible College". Regelmäßig erscheinende "Newsletter" dienen zur Information über Trends und über Arbeiten der Mitglieder. Die "Newsletter" werden jeweils von Kollegen bzw. Kolleginnen herausgegeben, deren Institutionen über die nötigen Möglichkeiten verfügen. Das nächste Newsletter wird herausgegeben von: Prof. Dr. Hans Niedderer/Universität Bremen/Kufsteinerstr./D 2800 Bremen.

(b) Die zweite Gruppe ist als Special Interest Group von AERA (American Educational Research Association) institutionalisiert. Diese SIG gibt ebenfalls regelmäßig ein Newsletter heraus. Man kann Mitglied dieser Gruppe werden, ohne AERA anzugehören. Zur Zeit wird das Newsletter betreut von: Dr. Jeffrey Bloom/Queens University, Faculty of Education/Kingston, Ontario, Canada K7L 3N6.

Andere Bibliographien

Wie im Vorwort bereits erwähnt, gibt es einige weitere Bibliographien des hier dokumentierten Forschungsgebiets. Die beiden im folgenden zuerst genannten sind jeweils auf ein Fach beschränkt. Die Bibliographie von Giordan enthält auch Arbeiten zur Biologiedidaktik, die nicht zum hier dokumentierten Gebiet zählen. Am umfassendsten ist die letztgenannten, von Kollegen der University of Leeds zusammengestellte. Sie enthält etwa 1600 Einträge. Einige der zur Kategoriesierung verwendeten Schlagwörter sind der in der vorliegenden Bibliographie benutzten ähnlich oder gleich. Die mir am wichtigsten erscheinenden Arbeiten der ersten vier im folgenden genannten Bibliographien habe ich in die vorliegende Bibliographie aufgenommen (die aus der Bibliographie von Bredderman aufgenommenen Arbeiten finden sich in Anhang 1). Eine Liste der Arbeiten der fünften Bibliographie, die in der vorliegenden nicht vorhanden sind, findet sich in Anhang 2.

Maloney, D.P (1987). Cognitive physics research - a bibliography (2nd edition). Indiana University, Purdue at Fort Wayne

Giordan, A. (1987). Bibliographie concernant les recherches sur les conceptions des apprenants en biologie. Annales de didactique des sciences No. 2, Biodic LDES

Dykstra, D., Schroeder, S. (1987). Published materials in science education: alternative conceptions and cognitive development. Paper of the Departement of Physics, Boise State University

Bredderman, T. (1990). Research literature on alternative conceptual frameworks and conceptual change. University of Albany, Department of Educational Theory and Research

Charmichael, P., Driver, R., Holding, B., Phillips, I., Twigger, D., Watts, M. (1990). Research on students' conceptions in science: a bibliography. Children's Learning in Science Group. Leeds: The University of Leeds

Einige Hinweise auf Übersichtsartikel und Zusammenfassungen

Eine Bibliographie mit etwa 2 000 Literaturstellen ist für diejenigen, die sich in das Forschungsgebiet einarbeiten wollen, schwierig zu übersehen, auch wenn durch die Untergruppen und Schlagwörter bereits eine gewisse Strukturierung vorhanden ist. Im folgenden soll deshalb versucht werden, einige Hinweise auf Arbeiten zu geben, die sich - aus meiner Sicht - eignen, in das Forschungsfeld einzusteigen.

(a) Allgemeine Übersichten über das Forschungsgebiet

Driver, R., Erickson, G. (1983). Theories-in-action: some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 37 - 60

Gilbert, J., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: changing perspectives in science education. Studies in Science Education 10, 1983, 61 - 98

Hashweh, M. (1986). Towards an explanation of conceptual change. European Journal of Science Education 8, 1986, 129 - 289

Driver, R. (1989). Students' conceptions and the learning of science. International Journal of Science Education 11, 481-490 (Dies ist der einführende Artikel eines Themenheftes, das einen Überblick über Forschungsansätze des hier in Rede stehenden Gebietes gibt.)

Duit, R. (in press). Students' conceptual frameworks-consequences for learning science. In: Glynn, S., Yeany, R., Britton, B. (Eds.): The psychology of learning science. Hillsdale: Erlbaum

(b) Tagungsbände

Tagungsbände sind in besonderer Weise geeignet, einen Überblick über das Forschungsgebiet zu geben. Die drei oben bereits genannten Tagungsbände (Archenhold, u. a. 1980; Helm, H., Novak, J., 1983; Novak, J., 1987) dokumentieren die wohl größten Tagungen auf dem hier in Rede stehenden Forschungsgebiet. Sie spiegeln zugleich die Entwicklung des Gebietes. Weitere Tagungsbände sind:

Duit, R., Säljö, Eds. (1988). Students' conceptions of subject matter content. Proceedings of a Symposium at the 2. European Conference on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief

Adey, P., Ed. (1989). Adolescent development and school science. London: Falmer Press

(c) Bücher

Es gibt bereits eine Reihe von Büchern, in denen versucht wird, die wichtigsten Ansätze und Ergebnisse zusammenzufassen. Als Standortbestimmung für die weitere Planung des Forschungsgebietes diente in der Bundesrepublik Deutschland z. B. der folgende Band:

Duit, R., Jung, W., Pfundt, H., Hrg. (1981). Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis

Eine Zusammenfassung der wichtigsten Ergebnisse (vor allem im Bereich der Physik) und Grundideen des Forschungsgebietes für den Lehrer bietet ein Themenheft einer Zeitschrift:

Duit, R., Jung, W., Rhöneck, Ch. v., Hrg. (1986). Alltagsvorstellungen - Energie - Elektrik - Optik - Mechanik - Wärme - Teilchen - Stoff. Naturwissenschaften im Unterricht - Physik Chemie 34

Ebenfalls auf eine Zusammenfassung der Ergebnisse von Forschungsarbeiten (vor allem auf dem Gebiet der Physik) konzentriert sich:

Driver, R., Guesne, E., Tiberghien, A., Eds. (1985). Childrens' ideas in science. Milton Keyne: Open University Press

Etwas allgemeiner angelegt sind die folgenden beiden Bände:

Osborne, R., Freyberg, P., Eds. (1985). Learning in Science. The implication of children's science. Auckland, London: Heinemann

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle

(d) Zusammenfassung von Untersuchungen zu Vorstellungen in einzelnen Gebieten

Lehrer, Lehrbuchautoren und Entwickler von Curriculummaterialien werden vor allem daran interessiert sein, zu erfahren, mit welchen Vorstellungen in bestimmten Bereichen (z.B. beim elektrischen Stromkreis) zu rechnen ist. Die Untergliederung der Gruppe "g6" bietet den Zugang zu allen in der Bibliographie vertretenen Arbeiten zu dem betroffenen Gebiet. Zu einigen Gebieten gibt es auch Zusammenfassungen.

Das unter (c) genannte Themenheft "Alltagsvorstellungen" faßt Ergebnisse zu den Gebieten: Energie, Elektrik, Optik, Mechanik, Wärme und Teilchen zusammen. Im ebenfalls unter (c) genannten Band von Driver u. a. finden sich Zusammenfassungen zu den Gebieten Optik, Elektrik, Wärme, Mechanik (Kraft und Bewegung), Teilchen und Astronomie. Eine weitere gute Übersicht zum Gebiet "Kraft und Bewegung" bietet:

McDermott, L. (1984). Research and conceptual understanding in mechanics. Physics Today, July 1984, 24 - 32

In deutschem Sprachraum wären Beiträge im Themenheft "Kraftbegriff" der Zeitschrift "Naturwissenschaften im Unterricht-Physik/Chemie" (Heft Mai 1988) zu nennen oder Abschnitte aus:

Schecker, H. (1985). Das Schülerverständnis zur Mechanik. Dissertation, Universität Bremen

Über Untersuchungen im Bereich der Elektrizitätslehre informiert umfassend ein Tagungsband:

Duit, R., Jung, W., Rhöneck, Ch. v., Hrg. (1985). Aspects of understanding electricity. Kiel: IPN

Für den Bereich des Teilchenmodells der Materie liegt ebenfalls ein Tagungsband vor, der den heutigen Wissensstand zusammenfassend präsentiert:

Linjse, P.L., Licht, P., de Vos, W., Waarlo, A.J. eds. (1990). Relating macroscopic phenomena to microscopic particles. Utrecht: The University of Utrecht, Centre for Science and Mathematics Education

Leider gibt es weder im Bereich der Chemie noch im Bereich der Biologie meines Wissens zur Zeit ähnliche Zusammenfassungen zu einzelnen Teilgebieten. Dort bleibt also nur der Zugang über die Bibliographie unter "g6, C" bzw. "g6, B".

(3) TRENDS IM FORSCHUNGSGEBIET "VORSTELLUNGEN UND NATURWISSENSCHAFTLICHER UNTERRICHT"

Übersichtstabellen

Die Tabellen 1 und 2 geben einen Überblick über Stand und Entwicklung des Forschungsgebietes. Tabelle 1 gibt auf der Basis der vorliegenden Ausgabe der Bibliographie die Anzahl der Arbeiten in den Gruppen g1 bis g9 an, die in bestimmten Zeitabschnitten publiziert worden sind. Von 1971 bis 1990 sind Unterteilungen in Vierjahresabschnitte gewählt worden. Es zeigt sich, daß Mitte der 70er Jahre der heutige Boom an Forschungsarbeiten einsetzte und daß er bis heute unvermindert anhält. Der Schwerpunkt der aufgenommenen Arbeiten liegt in g6, d.h. rund die Hälfte von ihnen beschäftigen sich mit Untersuchungen zu Schülervorstellungen zu naturwissenschaftlichen Phänomenen, Begriffen und Prinzipien. Dabei dominiert die Physik bei weitem. Erst seit Beginn der 80er Jahre kommen Untersuchungen zu neuentwickelten Unterichtsansätzen (g7) in nennenswertem Umfang hinzu. Seit Mitte der 80er Jahre ist ein deutlicher Trend zu einer allgemeineren Orientierung abzulesen. Er spiegelt sich in der Tabelle 1 vor allem in den Zeilen für g8 (Vorstellungen der Lehrer), g9 (Konsequenzen für die Lehrerbildung), CTL (Vorstellungen vom Lernprozeß) und SCS (Vorstellungen zur Natur und Reichweite naturwissenschaftlicher Kenntnisse).

In Tabelle 2 sind die Untersuchungen zu Schülervorstellungen (also die Einträge in g6) aufgegliedert nach physikalischen Teilgebieten und nach Chemie und Biologie. Es zeigt sich einerseits die große Dominanz der Physik. Andererseits dürfte auffallen, daß es auch in diesem Fach noch große Lücken unseres Wissens über Schülervorstellungen gibt. So befassen sich gerade 11 der aufgenommenen Artikel mit moderner Physik (dort vor allem mit der Quantenmechanik). Aber auch zu so klassischen Gebieten der Physik wie Schall oder Magnetismus gibt es nur wenige Untersuchungen. Es kann also keine Rede davon sein, daß Untersuchungen zu Schülervorstellungen nicht mehr nötig seien. Das Gegenteil ist der Fall. Unser Wissen darüber ist lückenhaft. Tabelle 2 und die entsprechenden Literaturlisten unter g6 mögen helfen, solche Lücken aufzuspüren und zu beseitigen.

	<1960	60-70	71-74	75-78	79-82	83-86	87-90	Summe
g1	9	5	19	45	91	154	165	668
g2	-	2	1	2	3	8	5	21
g3	-	-	4	3	3	14	16	40
g4	6	17	11	12	14	18	19	97
g5	2	1	5	10	53	74	86	231
g6	36	38	38	79	210	365	355	1121
g6,P	8	15	19	41	129	262	239	713
g6,C	3	2	5	8	23	28	58	127
g6,B	10	8	12	13	21	68	64	196
g7	-	7	6	13	26	115	156	323
g7,P	-	-	1	10	16	70	107	204
g7,C	-	5	-	3	1	2	15	26
g7,B	-	-	1	1	4	13	17	36
g8	3	-	-	-	2	11	53	66
g9	-	-	-	-	-	2	27	29
CTL	-	-	-	-	2	7	39	48
CTL	-	-	-	-	2	-	19	21
Gesamt	47	69	82	150	339	596	708	1991

Tab. 1.
Anzahl von Beiträgen in den Gruppen g1 bis g9 - Jahreszeiträumen zugeordnet. In der Spalte "Summe" findet sich die Gesamtzahl der z. Zt. in der Bibliographie in die Gruppen eingeordneten Beiträge.

MECHANIK	281	Kraft und Bewegung/Arbeit,Energie,Leistung/Geschwindigkeit, Beschleunigung/Gravitation Druck/Dichte/Schwimmen und Sinken
ELEKTRIK	146	einfache, verzweigte Stromkreise/Modelle des Stromflusses/Stromstärke, Spannung, Widerstand/Elektrostatik/Elektromagnetismus/Gefahren des Stromes
WÄRME	68	Wärme und Temperatur/Wärmeausbreitung/Ausdehnung bei Erwärmung/Zustandsänderungen, Gefrieren, Sieden/Erklärung der Wärmephänomene im Teilchenmodell
OPTIK	69	Licht/Lichtausbreitung/Sehen/Farben
TEILCHEN	60	Struktur der Materie/Erklärung von Phänomenen(z.B. Wärme, Zustandsänderungen)/Atomvorstellungen/Radioaktivität
ENERGIE	69	Energieumwandlung/ - erhaltung/ - entwertung
ASTRONOMIE	36	Vorstellungen zur Erde und anderen Himmelskörpern/Satelliten
"MODERNE" PHYSIK	11	Quantenmechanik/spezielle Relativitätstheorie
CHEMIE	132	Verbrennung/Oxidation/chemische Reaktionen/Umwandlungen der Stoffe/chemisches Gleichgewicht/Symbole/Molkonzept
BIOLOGIE	208	Pflanzenernährung/Photosynthese/Osmose/Leben/Herkunft des Lebens/Evolution/Blutkreislauf/Genetik/Gesundheit/Wachstum

Tab.2: Untersuchungen zu Schülervorstellungen in verschiedenen Gebieten (die Zahlen geben die Anzahl der Artikel an, die in der vorliegenden Ausgabe der Bibliographie aufgeführt sind)

Zu dem, was mit "Vorstellungen" gemeint ist

Im Titel der vorliegenden Bibliographie sowie in dieser Einführung wird ganz bewußt ein recht vager Terminus, nämlich Vorstellungen, verwendet. Alltagsvorstellungen sind dabei solche, die ihren Ursprung in Alltagserfahrungen haben. Im deutschen Sprachraum sind einige weitere Termini vorgeschlagen worden, so

z. B. Konzept oder Vorverständnis. Im internationalen Raum gibt es eine sehr große Zahl weiterer Termini (z.B. alternative frameworks, misconceptions, conceptions, notions, belief systems und viele andere). Diese Termini sind keineswegs gleichbedeutend, sie kennzeichnen vielmehr spezielle Aspekte des Gesamtfeldes im Rahmen bestimmter theoretischer Konzeptionen (s. dazu meine Übersicht in Duit, 1987, gl; S. 8). Die große Zahl von Termini signalisiert eine Theorievielfalt im Forschungsgebiet. Dies wäre positiv betrachtet. Eher negativ betrachtet, ist unverkennbar, daß es bislang lediglich Ansätze zu übergreifenden Theoriebildungen gibt. Die Verwendung eines so vagen Terminus wie "Vorstellung" kann deshalb auch als Ausdruck einer gewissen Theorielosigkeit (wenn man eine übergreifende Theorie im Auge hat) angesehen werden.

Unverkennbar ist selbstverständlich ein breiter Konsensbereich der unterschiedlichen theoretischen Ansätze. Ansonsten hätte sich das Forschungsgebiet gar nicht herausbilden können. Es geht dabei um die folgende Auffassung vom Lernen. Lernen wird nicht als ein passives Übernehmen von Wissen angenommen. Lernen wird vielmehr als sehr aktiver Prozeß gesehen – als Prozeß, bei dem der Lernende aktiv sein Wissen selbst konstruieren muß, auf der Basis der Vorstellungen (Konzepte, ...), die er bereits vorher erworben hat. Diese bereits erworbenen Vorstellungen, d. h. diese bereits in der kognitiven Struktur abgespeicherten geistigen Entwürfe, spielen eine ganz zentrale Rolle im Lernprozeß. Sie beeinflussen die Interpretation der sinnlichen Wahrnehmungen und deren Weiterverarbeitung. Die vorstehend ganz kurz (und sicherlich in mancher Hinsicht auch verkürzt) dargestellte Auffassung vom Lernen ist die Grundidee, die im Durchschnitt aller Ansätze im Forschungsgebiet liegt oder, in einem anderen Bild ausgedrückt, die als gemeinsamer Nenner angesehen werden kann. Für diesen gemeinsamen Nenner hat sich die Bezeichnung "konstruktivistische" Sichtweise durchgesetzt, zunächst vor allem im angelsächsischen Raum, seit kurzem auch in der Bundesrepublik Deutschland (s. dazu auch weiter unten).

Zur Entstehung des Forschungsgebiets in der Mitte der 70er Jahre

Diese "konstruktivistische" Grundidee ist keineswegs neu. Sie liegt z. B. Ausubels pädagogischer Psychologie zugrunde, kann aber weit in die Geschichte der Pädagogik und des naturwissenschaftlichen Unterrichts zurückverfolgt werden (s. Jung, 1985, gl; S. 18). Etwa seit Beginn des 20. Jahrhunderts gibt es auch ein Interesse, die Vorstellungen der Schüler im Bereich der Naturwissenschaften kennenzulernen. Piagets Arbeiten sind hier natürlich als der Meilenstein zu nennen. Zu erinnern ist im deutschen Sprachraum auch an die Kette von Arbeiten im Bereich der Naturlehre, die beginnend mit Banholzer und Zietz in den 30er Jahren, allerdings unterbrochen durch den 2. Weltkrieg, bis zur großen Bildungsreform Ende der 60er Jahre reichen.

Seit etwa der Mitte der 70er Jahre gibt es - weltweit (wobei dies vor allem für die sogenannte "westliche Welt" gilt) - geradezu einen Boom von Forschungsarbeiten (s. Tabelle 1). Es scheint so zu sein, daß ein Zusammentreffen der Interessen zweier Gruppen den entscheidenden Anstoß für diese Forschungsarbeiten gegeben hat. Zu den Initiatoren zählen nämlich einerseits Fachdidaktiker, also Personen, denen es um die Verbesserung des Unterrichts ging. Die Curriculumbewegung der 60er und frühen 70er Jahre hatte nicht den durchschlagenden Erfolg gebracht, den man sich erhofft hatte. Die Orientierung an den grundlegenden Konzepten der Wissenschaften ("structures of the disciplins") hatte jedenfalls nicht dazu geführt, Lernprobleme wesentlich zu mindern. Nach wie vor erwies es sich als äußerst schwierig, die Schüler von ihren vorunterrichtlichen Vorstellungen zu den wissenschaftlichen zu führen. Auf der anderen Seite waren es Vertreter der Kognitionspsychologie, die sich vom bislang beherrschenden behavioristischen Ansatz lösten. Dieser war eher der oben skizzierten "passiven" Sicht des Lernprozesses zuzuordnen, die neuen Ansätze dagegen der "aktiven". Die Interessen beider Gruppen trafen sich, es kam zu mannigfaltigen Kooperationen. Die Schwerpunkte der Forschungen lagen in der Untersuchung von "Vorstellungen". Die Fachdidaktiker waren daran interessiert, zunächst einmal die Vorstellungen in den wichtigsten naturwissenschaftlichen Gebieten festzustellen, die Schüler in den Unterricht mitbringen und die Veränderung dieser Vorstellungen im Verlaufe des Unterrichts zu verfolgen. Die kognitionspsychologisch ausgerichteten Forschungen waren ganz allgemein an der Rolle der Vorstellungen beim Lernen bzw. beim Problemlösen interessiert. Naturwissenschaftliche (vor allem physikalische) Sachgebiete erwiesen sich als sehr geeignetes Forschungsfeld. Der Schwerpunkt der Forschungsarbeiten lag also zunächst in der Gruppe, die im Rahmen der vorliegenden Bibliographie mit "g6: Untersuchungen zu Vorstellungen von Schülern und Studenten" bezeichnet wird (s. Tabelle 1).

Weiterentwicklung I: Konsequenzen für den Unterricht

Zunehmend befaßt man sich nicht allein mit der "Erhebung" von Vorstellungen und mit der Konstatierung, daß diese im herkömmlichen Unterricht schwer zu verändern sind. Untersuchungen, in denen Konsequenzen aus den vorstehend genannten Resultaten nicht nur theoretisch entworfen, sondern auch empirisch untersucht werden, nehmen einen immer größeren Raum ein. In der Bibliographie erkennt man es daran, daß auch die Anzahl der Untersuchungen unter "g7: Unterricht unter Berücksichtigung von Vorstellungen der Schüler" stark zunimmt (s. auch Tabelle 1).

Die wichtigsten "Maßnahmen", die zur Verbesserung des Unterrichts entwickelt werden, scheinen mir die folgenden zu sein (s. etwas ausführlicher in Duit, 1987, g1; S. 8):

- Die Sachstruktur des Unterrichts wird geändert.
- Neue Lehr- und Lernhilfen (neue Lehrbücher, neue Experimente, insbesondere auch neue Computerprogramme) werden entwickelt.
- Neue Lehrstrategien werden erprobt. Dabei handelt es sich nicht immer um "wirklich" neue Strategien. Es finden sich dort auch einige "alte Bekannte", die man bislang z. B. unter "entdeckendem Lernen" eingeordnet hatte.
- Strategien des Meta-Learning werden eingesetzt, d. h. es wird versucht, den Schüler zu einer neuen "Vorstellung" von seinem Lernprozeß zu führen (s. dazu auch weiter unten).
- Es wird versucht, Lehrer vom "neuen" Bild des Lernens (also der oben skizzierten "aktiven" Sicht) zu überzeugen, um dadurch anderes Lehrverhalten zu erzielen.

Weiterentwicklung II: Von Vorstellungen über naturwissenschaftliche Phänomene, Begriffe und Theorien zu Vorstellungen über die Natur und Reichweite wissenschaftlicher Wissensbestände sowie über den Lernprozeß

Wie erwähnt, startete das Forschungsgebiet Mitte der 70er Jahre mit Untersuchungen der Vorstellungen von Schülern bzw. Studenten über naturwissenschaftliche Phänomene, Begriffe und Theorien. Inzwischen nimmt man weitere "Vorstellungen", die das Erlernen bestimmen, in den Blick. Dazu zählen zunächst einmal Vorstellungen zur "Natur und Reichweite" naturwissenschaftlicher Wissensbestände. Es ist einleuchtend, daß das "Bild der Naturwissenschaften", das sich ein Schüler macht, beeinflußt, wie er/sie Naturwis senschaften lernt. Einen weiteren Schritt zu sehr allgemeinen Vorstellungen, die Lernen beeinflussen, geht man mit der Erforschung des Einflusses des "Bildes", das sich Schüler vom eigenen Lernen machen (s. dazu die unter dem Schlagwort CTL eingeordneten Arbeiten; S. 209 ff). Wer z. B. Lernen vorwiegend als Einfüllen von Lehrstoff ansieht, den der Lehrer bzw. ein Lehrbuch präsentiert, lernt entsprechend, d. h. nimmt eine Haltung ein, die weiter oben als "passiv" bezeichnet worden ist. Schließlich werden auch die Einstellungen und Interessen der Schüler sowohl zu naturwissenschaftlichen Wissensbeständen wie auch zum Lernen insgesamt in den Blick genommen (s. die Artikel mit dem Schlagwort CSC; S. 205 ff).

Während ursprünglich der Schüler bzw. Student (also der Lernende) fast ausschließlich im Blickpunkt stand, wird zunehmend versucht, auch die Vorstellungen der Lehrer zu berücksichtigen (s. g8). Dabei handelt es sich um Vorstellungen in der gleichen Breite, wie sie heute beim Schüler berücksichtigt werden.

Die hier skizzierten Ausweitungen des Forschungsgebietes sind sehr tiefgreifend. Sie ergeben sich einerseits zwingend aus dem Grundansatz, daß Lernen ein aktiver Konstruktionsprozeß auf der Basis der bereits erworbenen "Vorstellungen" (Konzepte, Einstellungen, Interessen) ist. Sie können das Arbeitsgebiet aber andererseits zu einem Punkt führen, an dem die Komplexität des untersuchten Feldes nicht mehr zu bewältigen ist. Die Ausweitungen haben ja von einer Reduktion auf einen wichtigen Aspekt zu immer größerer Komplexität geführt. Es wird nunmehr in vielen Ansätzen versucht, die "volle" Komplexität des Unterrichts in den Blick zu nehmen. Es muß abgewartet werden, ob dies gelingt.

Weiterentwicklung III: Die theoretischen Ansätze

Die Fachdidaktiker im deutschsprachigen Raum, die Mitte der 70er Jahre das Forschungsgebiet initiierten, standen in einer langen Tradition, nämlich im Unterricht dort anzufangen, wo sich der Schüler befindet. Dies bedeutete auch, die Vorstellungen der Schüler angemessen zu berücksichtigen. Ähnliche Traditionen hat es in anderen Ländern sicher ebenfalls gegeben. Eine weltweit beachtete und akzeptierte Neuformulierung dieser Traditionen hat Ausubel gegeben. Sein Dictum "The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" wurde und wird wohl auch heute von den meisten Forschern als zentraler Aspekt der Arbeit akzeptiert. Interessant ist es, die Rolle Piagets zu betrachten. Sie war nämlich durchaus zwiespältig. Auf der einen Seite standen alle Forscher sozusagen auf den Schultern von Piaget. Ohne seine theoretischen Ansätze, ohne seine grundlegenden Untersuchungen und ohne seine Interviewtechniken wären viele Unternehmungen sicher ganz anders verlaufen. Auf der anderen Seite aber setzte sich das neue Forschungsgebiet ganz bewußt von Piaget ab. Man war - jedenfalls sehr häufig - der Auffassung, daß die "inhaltlichen" naturwissenschaftlichen Vorstellungen (z. B. zum Sehen, zur Wärme, zum Begriff des Tieres) eine größere Bedeutung für den Lernprozeß haben, als die sehr allgemeinen Denkoperationen nach Piaget. Die Auseinandersetzungen zwischen "Piagetians" und "Alternative Frameworkers" wurden eine Zeit lang sogar mit beträchtlicher Schärfe geführt. Es hat den Anschein, daß sich heute eine vermittelnde Position durchgesetzt hat. Es wird jedenfalls meist anerkannt, daß beide Gesichtspunkte, nämlich "allgemeine Denkoperationen" wie "Vorstellungen" eine wichtige Rolle spielen.

Die zweite oben genannte Gruppe der Initiatoren des Forschungsgebietes, nämlich Vertreter der Kognitionspsychologie, haben wichtige theoretische Ansätze in das Forschungsgebiet eingebracht. Netzwerktheorien und Theorien der Informationsverarbeitung mit dem Computer als leitendes Paradigma sind hier beispielsweise zu nennen.

Zweifellos haben wissenschaftstheoretische Ansätze, die mit den Namen von Hanson, T. S. Kuhn, Lakatos und Feyerabend verbunden sind, einen ganz wesentlichen Einfluß gehabt. Auch sie haben ganz entscheidend dazu beigetragen, daß sich das Forschungsgebiet bildete und schnell wuchs. Dies ist auch gar nicht erstaunlich, denn schließlich spielt in diesen Ansätzen die Idee eine zentrale Rolle, daß alle Erkenntnis "theoriegeleitet", d. h. geleitet durch die herrschenden Vorstellungen ist.

Die starke Aufmerksamkeit, die Forschung auf dem hier in Rede stehenden Gebiet seit der Mitte der 70er Jahre gewidmet wird, geht also nicht zuletzt auch darauf zurück, daß wichtige Strömungen wissenschaftlichen Denkens aufgenommen und weitergeführt wurden. Die Forschungen lagen - so betrachtet - "im Trend der Zeit". Es sind selbstverständlich nicht allein die genannten wissenschaftstheoretischen Positionen "verarbeitet" worden. Beeinflußt ist das Forschungsgebiet mittelbar auch durch neues naturwissenschaftliches Denken, das durch das Schlagwort der Selbstorganisation offener Systeme hier nur kurz gekennzeichnet werden kann. Dieses "Denken" seinerseits hat vielfältige Beziehungen zu Ansätzen der Künstlichen Intelligenz. In die skizzierten Strömungen fügt sich die "Wiederentdeckung" konstruktivistischer Ansätze nahtlos ein. Sie haben für das Forschungsgebiet "Vorstellungen und naturwissenschaftlicher Unterricht" eine große Bedeutung erhalten.

Etwa seit Beginn der 80er Jahre werden konstruktivistische Ansätze für das Forschungsgebiet ganz explizit nutzbar gemacht. Dies gilt in großer Breite. Einerseits nämlich geht es um persönlichkeitstheoretische Ansätze (wie z. B. von G. Kelly), andererseits um sozialpsychologische Ansätze (wie z. B. von Vygotsky). So fruchtbar die Einbeziehung solcher konstruktivistischen Ansätze auch ist, so gibt es doch einen unübersehbaren Trend im Forschungsgebiet, der mit aller Vorsicht und Skepsis zu sehen ist, nämlich die Arbeiten im gesamten Gebiet in Bausch und Bogen nunmehr mit dem Wort konstruktivistisch zu belegen. Denn allzuhäufig verbirgt sich hinter diesem "Label" kaum mehr als die oben skizzierte "aktive" Sicht des Lernens. Diese Idee ist aber zu allgemein, um als theoretische Grundlegung des gesamten Gebiets fruchtbar werden zu können. Wenn man von einer solchen oberflächlichen Übernahme eines "trivialen" Konstruktivismus absieht, so hat die Sichtweise auch in den nächsten Jahren dem Forschungsgebiet wesentliches zu bieten. Sie gibt Anregungen zur Entwicklung neuer Ansätze und zur Einbeziehung einer größeren Breite von Aspekten, die das Lernen in den Naturwissenschaften beeinflussen.

Reinders Duit: INTRODUCTION

(1) HOW TO USE THE BIBLIOGRAPHY

Aims of our collection of literature

Considerable attention has been paid to research on students' notions (students' conceptions) since the middle of the 1970s. We began collecting papers when we started research in this field some 13 years ago. We wanted to form a comprehensive picture of what had already been done in order to avoid "inventing the wheel" again. We have kept on collecting papers because we feel this to be the best way to keep track of what is going on in a rapidly expanding research field. We hope that the present bibliography may help colleagues to keep an eye on developments, or to form an initial impression when starting research.

We would like to accompany the bibliography with a request:

Please send your new articles or articles not contained in the bibliography so far, especially articles which are not published in journals, proceedings, books or the like. We will add your contributions to a supplementary or new edition of the present bibliography.

Unfortunately, we must draw your attention to the following:

Although our collection of literature may be used by anyone who visits the IPN, it is not possible for us to make copies of publications named in our lists. In this case please contact the authors themselves.

The main emphasis of the bibliography

Main emphasis of the bibliography is physics, chemistry and biology education but also studies on earth science are considered. They are listed in the groups g6, g7 and g8 under "others". Research on students' notions is not only carried out in science. For mathematics in particular many interesting papers are available. The following proceedings may provide valuable access to this field of research:

Archenhold, W. F., Orton, A., Driver, R., Wood-Robinson, C., Eds. (1980). Cognitive Development. Research in Science and Mathematics. Proceedings of an International Seminar. Leeds: The University of Leeds

Helm, H., Novak, J., Eds.(1983). Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca: Cornell University

Novak J., Ed. (1987). Proceedings of the Second International Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol. I, II, III. Ithaca: Cornell University, 1987

A close cooperation of science and mathematics educators concerning students' conceptions research so far has not taken place. Here an important field of valuable work is waiting for the attention of researchers.

The structure of the bibliography

We have divided the works into nine groups:

g1 General considerations concerning research in this area

This comprises works which deal quite generally with this field of research.

g2 Everyday notions and scientific notions

This group deals specifically with relations between everyday notions and scientific notions.

g3 Development of notions in the history of science as compared to development of notions in individuals

Many studies have shown that notions occur among pupils today which also played a role in the historical development of science. The work of this group investigates the significance of historical development for the development of notions in the individual.

g4 Language and notions

Many notions originate in everyday language, a problem area investigated here.

g5 Methods of investigation

To this group we have assigned publications which discuss methods of investigation.

g6 Investigations of students' notions

This is by far the largest group and contains works which give information on notions in various areas. The works are divided into thematic areas (see below).

g7 Instruction taking students' notions into account

This group comprises investigations concentrating on instruction in which students' notions are taken into account. Again the works are divided into thematic areas.

g8 Investigations of teachers notions

Teachers' conceptions of various kinds are put into this group, as in g6 the works are divided into thematic areas. To differentiate between students' and teachers' conceptions is sometimes not easy. In literature occasionally student teachers' conceptions are called teachers' conceptions. The present group of the bibliography only contains studies on conceptions of teachers who already work in school practice.

g9 Notions and teacher training

Trends in the research field described later forced us to open this group some 5 years ago. There was a growing number of papers on consequences of students' conceptions research on teacher training. Studies in which new approaches for teacher training (based at the constructivistic view) are developed and which report on empirical studies about the evaluation of such approaches are put into the group g9.

It is not always easy to assign particular work to a particular group. We hope, however, that in most cases the most obvious group has been chosen. Many contributions are assigned to several groups and are therefore accompanied by several keywords (see below).

In a research area still in rapid progress it is rather difficult to find a system of classifying categories which is open to new trends. The system of the groups g1 to g7 appeared to be suited for this purpose in 1980. Difficulties have more recently occurred which we have tried to compensate for by opening two further groups (g8 and g9) and by adding further keywords (see below). We hope that the enlarged system of groups and keywords is suitable to cover at least the main aspects of the present research field.

Further keywords are necessary for the many articles put into group g1. The many different general aspects discussed in the articles listed are not adequately portrayed by simply the authors in alphabetical order. Hopefully there will be some time in future to develop a set of appropriate keywords and to categorize the articles which have so far only been listed. Articles listed in groups g6 and g7 also require a more advanced set of keywords. There are so many studies in some of the sections that it would ease access if more keywords that point to science topics would be added. This is also true for physics where a fairly developed set of keywords is already in use. But it would be valuable to make further distinctions between the 281 studies on mechanics (keyword g6,P,M). Such an enlargement is even more necessary in biology and chemistry sections.

Keywords

The "keywords" g1 to g9 represent the above mentioned nine groups.

For works assigned to the groups g6, g7 and g8 we indicate further keywords. These apply first to the subjects:

P: physics
C: chemistry
B: biology

If a publication in group g6, g7 or g8 is not followed by one of these keywords, it does not deal specifically with notions relating to one of these subjects. Publications of this type include those which deal, for example, with general thought schemata such as causality, reversibility, conservation or proportionality.

As a vast amount of publications are available for the area of physics, we have introduced the following subdivisions:

E: electricity
T: heat (thermal physics)
M: mechanics (including mechanics of liquids and gases as well as changes of state of matter)
O: optics
AT: atoms and particles
AS: astronomy (including notions of the earth and other bodies in the universe)
EN: energy

Those works which are not included in any of these subcategories are to be found under "others". To avoid too many overlaps between chemistry and physics we assign studies on notions concerning particles and atoms to the area of physics alone.

There are a number of further keywords indicating further areas or concepts. They are not intended to be a systematic catalogue, but rather a reflection of the compilers' interests.

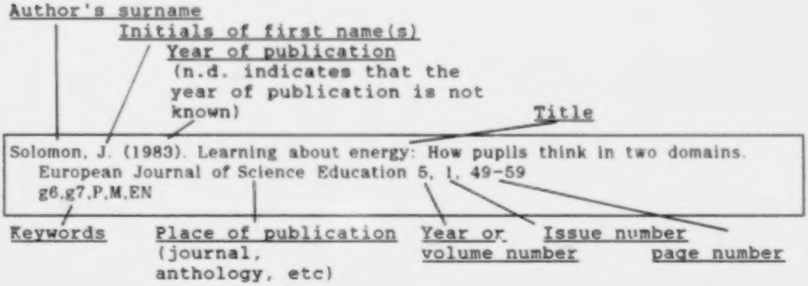
ENT:	entropy
FLD:	field
INF:	information
IRR:	irreversibility
MAG:	magnetism
Q:	quantum physics
R:	relativistic physics
STAT:	statistical physics
S:	sound

Further keywords refer to articles put into the groups g6, g7 and g8.

CTL:	Conceptions of the teaching and learning process. This keyword emphazises empirical investigations on conceptions (of students or teachers) on teaching and learning.
CSC:	Conceptions (on the "nature and range") of science. This keyword is used for empirical studies in which conceptions of science play a role.
STS:	Conceptions on the use of science for technology and society. Under the heading of "STS" research and development, work is carried out on the use of science outside science. Empirical studies investigating notions of such uses in technology and society are marked by the keyword STS.
GEN:	Empirical studies in which gender differences are investigated are marked by GEN.
OCI:	The article contains original quotations from interviews, questionnaires and the like.
OIM:	The article contains original drawings by students or teachers.

A list of all keywords is given at the end of this volume.

Explanations of the entries


Author's surname
Initials of first name(s)
Year of publication
(n.d. indicates that the year of publication is not known)
Title
Keywords
Place of publication (journal, anthology, etc)
Year or volume number
Issue number
page number

Solomon, J. (1983). Learning about energy: How pupils think in two domains. European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Files of the bibliography on floppy discs

A German program is used for storage and retrieval of the bibliography's entries. Colleagues who want to transfer the files of the bibliography to their program may receive a copy. Please send your floppy. I use an IBM compatible PC. The file is available in ASCII code or in WORD. More than 360 kB are needed. If you have 360 kB floppies please send two of them. The files contain the entries (an example is given above) of the bibliography in alphabetical order (first author).

(2) REMARKS ON THE RESEARCH FIELD

Informal groups of researchers

There are many colleagues around the world working in the field of students' conceptions which is one of the most active fields in the area of science education. The membership lists of two worldwide operating groups contain about 500 names. These groups are:

(a) **The "Invisible College"**. This is a group started some 10 years ago by John Gilbert to support international cooperation. This is a "private" enterprise. Colleagues who have the facilities (e.g. members of research institutes) edit a newsletter that reports about trends in the field and also contains hints on the new articles of the members. The editor of the next (1991) edition will be Prof. Dr. Hans Niedderer/University of Bremen/ Kufsteinerstr./ D 2800 Bremen/ Germany. Please contact Hans Niedderer if you want to join the group.

(b) **Special Interest Group "Subject structure and conceptual change" of the American Educational Research Association (AERA)**. This SIG also issues newsletters (two newsletters a year). It is possible to become a member of this group without being a member of AERA. If you are interested in this group, please contact Dr. Jeffrey Bloom/Queens University, Faculty of Education/ Kingston, Ontario, Canada K7L 3N6 who is in charge of this group at the moment (1991).

Other Bibliographies

As has been mentioned in the foreword there are some other bibliographies in the field of students' conceptions research available. Five are listed below. The first is restricted to physics, the second to biology. The second also contains publications on research work in biology education that does not belong to the research documented here. The bibliography of Charmichael et al is the largest and most elaborate. It contains some 1500 entries. Some of the keywords used there are similar or even identical with the keywords employed in the present bibliography. The main entries in the bibliographies one to four are also contained in the present bibliography (entries from Bredderman's bibliography in appendix 1). Entries which are contained in the fifth bibliography but not in the present one are listed in appendix 2, but they have not been categorized so far.

Maloney, D.P (1987). Cognitive physics research - a bibliography (2nd edition). Indiana University, Purdue at Fort Wayne

Giordan, A. (1987). Bibliographie concernant les recherches sur les conceptions des apprenants en biologie. Annales de didactique des sciences No. 2, Biodic LDES

Dykstra, D., Schroeder, S. (1987). Published materials in science education: alternative conceptions and cognitive development. Paper of the Department of Physics, Boise State University

Bredderman, T. (1990). Research literature on alternative conceptual frameworks and conceptual change. University of Albany, Department of Educational Theory and Research

Charmichael, P., Driver, R., Holding, B., Phillips, I., Twigger, D., Watts, M. (1990). Research on students' conceptions in science: a bibliography. Children's Learning in Science Group. Leeds: The University of Leeds

Some hints on reviews and summaries

The present bibliography contains some 2000 quotations. Users who are not so familiar with the research area and who want to get access to it may be troubled by the large number of articles. In order to make these many articles easier to handle some hints on review articles and on other summarizing publications are given in the following. Please keep in mind that the following selection has been made from my point of view. Although I have endeavored to avoid onesidenesses, there may still be some omissions.

(a) Reviews of the research area

Driver, R., Erickson, G. (1983). Theories-in-action: some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 37 - 60

Gilbert, J., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: changing perspectives in science education. Studies in Science Education 10, 61 - 98

Hashweh, M. (1986). Towards an explanation of conceptual change. European Journal of Science Education 8, 129 - 289

Driver, R. (1989). Students' conceptions and the learning of science. International Journal of Science Education 11, 481-490 (This is the introductory article of a special issue of this journal on students' conceptions research.)

Duit, R. (in press). Students' conceptual frameworks-consequences for learning science. In: Glynn, S., Yeany, R., Britton, B. (Eds.): The psychology of learning science. Hillsdale: Erlbaum

(b) Proceedings of conferences

Proceedings of the main conferences provide very valuable insights into research if papers are printed in full length. This is the case with the proceedings already mentioned above (Archenhold et al, 1980; Helm, Novak, 1983; Novak, 1987). At the same time these proceedings appear to mirror the development of the research area quite appropriately. Further proceedings are:

Duit, R., Säljö, Eds. (1988). Students' conceptions of subject matter content. Proceedings of a Symposium at the 2. European Conference on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief

Adey, P., Ed. (1989). Adolescent development and school science. London: Falmer Press

(c) Books

There are some books available in which the main approaches and results are summarized.

In Germany the following volume provided frameworks for planning research in our field:

Duit, R., Jung, W., Pfundt, H., Eds. (1981). Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis

A summary of research findings (mainly in the area of physics) as well as of main ideas of the research field has been worked out within a special issue of a German teachers' journal:

Duit, R., Jung, W., Rhöneck, Ch. v., Eds. (1986). Alltagsvorstellungen - Energie - Elektrik - Optik - Mechanik - Wärme - Teilchen - Stoff. Naturwissenschaften im Unterricht - Physik/Chemie 34

In English the following book provides a summary of research findings in a couple of thematic areas (also mainly physics areas):

Driver, R., Guesne, E., Tiberghien, A., Eds. (1985). Children's' ideas in science. Milton Keyne: Open University Press

A somewhat more general overview is provided by:

Osborne, R., Freyberg, P., Eds. (1985). Learning in Science. The implication of children's science. Auckland, London: Heinemann

A Special Issue of the International Journal of Science Education (December 1989) provides an overview of approaches and research findings (see the introductory article of Driver mentioned above in section (a)).

In French the following book based on research results is available:

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle

(d) Summaries of research results on conceptions in thematic areas

Teachers, textbook authors and other developers of teaching and learning materials will be interested in students' conceptions in specific thematic areas (e.g. electric circuit, combustion, chemical reactions, genetics) The subdivisions of g6 in the present bibliography facilitate access to articles of interest. In a couple of areas summaries are available.

The above mentioned (s. (c)) issue of a German journal "Alltagsvorstellungen" provides summaries of students' notions on energy, electricity, optics, mechanics (especially force and movement), heat and particle model. In the book by Driver et al. also mentioned above (s. (c)) there are summaries of the areas of light, electricity, heat, mechanics (force and movement), particle model and astronomy. Another very valuable summary of conceptions in the area of mechanics is provided by:

McDermott, L. (1984). Research and conceptual understanding in mechanics. Physics Today, July 1984, 24 - 32

In German a summary of the same area is contained in:

Schecker, H. (1985). Das Schülerverständnis zur Mechanik. Dissertation Universität Bremen

On electricity a conference was held in 1984. The proceedings provide a summary of this area:

Duit, R., Jung, W., Rhöneck, Ch. v., Eds. (1985). Aspects of understanding electricity. Kiel: IPN

Concerning the particle model there are also proceedings of a conference available that summarize the state of the art in this area:

Linjse, P.L., Licht, P., de Vos, W., Waarlo, A.J., Eds. (1990). Relating macroscopic phenomena to microscopic particles. Utrecht: The University of Utrecht, Centre for Science and Mathematics Education

Summaries of thematic areas of chemistry and biology do not appear to be available so far. Of course, the latest papers on a thematic area usually try to summarize findings of preceding studies. To gain access to such articles the subdivisions "g6, C" and "g6, B" will help.

(3) REMARKS ON TRENDS IN THE RESEARCH AREA "STUDENTS' CONCEPTIONS AND SCIENCE EDUCATION"

Overviews

Tables 1 and 2 provide some figures on the state and development of the research field. The figures in tab. 1 indicate the number of articles in the present bibliography in the groups g1 to g9 (as well as in some subgroups) that have been published at particular periods in time. From 1971 to 1990 periods of four years have been chosen. It becomes visible in tab. 1 that the present boom of research in the field started in the middle of the 70s and continues until the present. The largest number of articles (about 50%) have fallen into group g6 (i.e. they deal with investigations of students' conceptions on the content level). Most dominant is the area of physics. It is only since the beginning of the 80s that a considerable number of studies on newly developed learning and teaching approaches have been published (see the line of g7 in tab. 1). Tab. 1 further shows that there is another interesting trend towards a more general view of conceptions that started in the middle of the 80s. Only since then has there also been a considerable number of studies on teachers' conceptions (g8), on consequences for teacher training (g9), on students' and teachers' conceptions of the learning process (CTL) and on the range and nature of science knowledge (CSC).

	<1960	60-70	71-74	75-78	79-82	83-86	87-90	total
g1	9	5	19	45	91	154	165	668
g2	-	2	1	2	3	8	5	21
g3	-	-	4	3	3	14	16	40
g4	6	17	11	12	14	18	19	97
g5	2	1	5	10	53	74	86	231
g6	36	38	38	79	210	365	355	1121
g6,P	8	15	19	41	129	262	239	713
g6,C	3	2	5	8	23	28	58	127
g6,B	10	8	12	13	21	68	64	196
g7	-	7	6	13	26	115	156	323
g7,P	-	-	1	10	16	70	107	204
g7,C	-	5	-	3	1	2	15	26
g7,B	-	-	1	1	4	13	17	36
g8	3	-	-	-	2	11	53	66
g9	-	-	-	-	-	2	27	29
g1 to g9	47	69	82	150	339	596	708	1991

Table 1
Number of articles in groups g1 to g9 -
at particular intervals of time.
The column "total" presents the total number of
articles in a group

Mechanics	281	Force and motion/work,power,energy/speed, acceleration/gravity/pressure/density/ floating,sinking
Electricity	146	Simple,branched circuits/topological and geometrical structure/models of current flow/current,voltage,resistance/electrostatics/electromagnetism/danger of electricity
Heat	68	Heat and temperature/heat transfer/expansion by heating/change of state,boiling, freezing/explanation of heat phenomena in the particle model
Optics	69	Light/light propagation/vision/ color
Particles	60	Structure of matter/explanation of phenomena(e.g.heat,states of matter)/conceptions of the atom/radioactivity
Energy	69	Energy transformation/ energy conservation/ energy degradation
Astronomy	36	Shape of the earth/characteristics of gravitational attraction/satellites
"Modern" Physics	11	Quantum physics/special relativity
Chemistry	132	Combustion,oxidation/chemical reactions/ transformation of substances/chemical equilibrium/symbols,formula/mole concept
Biology	208	Plant nutrition/photosynthesis/osmosis/ life/origin of life/evolution/human circulatory system/genetics/health/growth

Table 2: Studies on Students' Conceptions in Different Areas (the figures give the number of articles contained in the present edition of the bibliography in a certain area)

Table 2 portrays investigations of students' conceptions on the content level (g6). The dominance of studies in the area of physics also becomes visible here, but it is also interesting that even in physics there are many topics of school physics where nothing or nearly nothing is known about students' conceptions. It might not be too surprising that the number of articles on modern physics is so low (only 11 articles), but it is remarkable that the number of studies on common topics such as magnetism or sound is very small. There is therefore still a need for further studies on students' conceptions on the content level. This is not only true for biology and chemistry but also for physics. Tab. 2 and the lists of articles in g6 may help to identify deficient fields.

On the many labels used to indicate students' notions

Many labels are used to indicate what is called students' notions, students' conceptions or students' alternative frameworks in this bibliography (e. g. misconceptions, students' science, mini theories, belief systems). The most "neutral" terms appear to be students' conceptions and students' notions, simply indicating mental representations of the outside world. The label "alternative framework" used in the title of the bibliography stands for a program accepted by the overwhelming majority of researchers in our field. This is a program which views students' conceptions as conceptions in their own right and not as false ideas which have to be erased as fast as possible (quite often the label misconception indicates the latter position). The labels used therefore stand for somewhat different or considerably different positions (see the overview in Duit, 1987, g1; p. 8). They are embedded in different theoretical frameworks. The large number of labels used therefore indicates that manifold theoretical approaches are employed in the research area. So far, no "unifying" theory appears to be in sight.

Of course, there is much concurrence among the manifold theoretical approaches despite the differences. The unifying basic idea is the following view of the learning process. Learning is not viewed as a passive taking over (filling in) of knowledge. Learning is viewed as a very active process. It is a process in which the learner has to construct actively his/her knowledge on the basis of the conceptions already present in the cognitive structure. These pre-conceptions play a decisive role in the learning process. They guide interpretation of sense impressions and the process of planting new pieces into the already existing cognitive structure. This constructivistic view of learning has become the common denominator of research in the field documented in the present bibliography.

Why did the research area start in the middle of the 1970s and grow so rapidly?

The "active" constructivistic view of learning we have just sketched is by no means a new one. It can be traced back far into the history of pedagogy and science instruction (see a German perspective in Jung, 1984, gl; p. 18). Since the beginning of the 20th century there have not only been thoughts in accordance with the "active" view but also empirical studies on students' conceptions of science phenomena. Of course, Piagets' seminal work must be mentioned here. But there are many other "early" studies too (see e.g. the review of Oakes, 1947, gl, p. 25).

Since the middle of the 1970s there has been a boom of research on students' conceptions in science - mainly in the "western" world. The start and the rapid growth of research appears to be due to the fact that the interests of science educators and cognitive psychologists met. On the one hand science educators were not too pleased with the outcomes of the curriculum movement in the 1960s and early 1970s. Despite many efforts (e.g. new experiments, new curriculum materials) and orientation to the structures of the disciplines students still had severe difficulties in learning science concepts and theories. The new curricula were not as successful as expected in guiding students from their (everyday) conceptions to those of science. Science educators therefore felt a need to study the role of pre-conceptions in learning science conceptions in more detail.

On the other hand cognitive psychologists tried to overcome the behavioristic view of learning which had dominated so far. The behavioristic view was close to the above mentioned "passive" view, the new cognitive psychology was in accordance with the "active" view.

The interests of the two groups met insofar as they were both interested in the role of preconceptions. Science educators wanted to find out the main preconceptions which have to be regarded along the students' path to the science conceptions. Cognitive psychologists wanted to investigate the role of preconceptions in the process of learning and problem solving in a very general manner. Science topics (especially physics topics) turned out to be well suited for this purpose. In the beginning, the main emphasis of research was in "g6 Investigations of students' notions" according to the interests mentioned above.

Trend I: From studies on conceptions to studies on the impact of newly developed teaching materials and teaching strategies

As we mentioned above, studies on students' preconceptions and changes which have occurred in such preconceptions during instruction predominated at the start of the research area and still play an important role. But there is a growing number of studies which investigate the impact of new approaches to overcoming the difficulties indicated by the studies in "g6". This trend is clear if one compares the number of quotations in "g7, Instruction taking students' notions into account" in the past four year periods as in tab. 2.

Several different kinds of consequences are drawn in the approaches available. The most important ones appear to be the following:

- Content structure of instruction is changed, i. e. the set-up of content is altered in order to meet students' difficulties.
- New teaching materials (new textbooks, new experiments, new computer programs and etc.) are developed.
- New teaching strategies are developed (e. g. what are known as constructivistic strategies). Of course, among the strategies proposed some "old friends" (such as socratic dialogue) are to be found.
- Strategies of meta-learning are employed in order to guide students to a new view of their learning process (see below for more remarks on this).
- Teachers' view of learning and teaching is altered in order to guide teachers from the still predominating "passive" view to the "active" one.

Trend II: Investigations of students' conceptions of the nature and role of science and of students' views of their learning process

The "active" view of learning underlying research in our field highlights the importance of preconceptions. When research began there was a concentration on cognitive preconceptions on the content level (i. e. on conceptions such as light, the electric circuit, combustion, photosynthesis, animals). Meanwhile a broader perspective has been adopted. At first, science conceptions on a "meta-level", i. e. conceptions of the nature and role of science knowledge, are considered (see articles with the keyword CSC; see p. 209 ff). This mirrors the conviction that the way science is learned is considerably influenced by the students' view of what science is about. Secondly, the students' view of their learning process is taken into consideration (see articles with the keyword CTL; see p. 205 ff). Research has shown that the view of learning influences learning considerably. A learner, for instance, who views learning as a process of filling in knowledge provided by the teacher or the textbook will learn accordingly, i. e. will adopt a "passive" learning habit. There is a further kind of "conception" dealt with by some studies now, namely students' interests and attitudes towards science and science instruction.

Another "enlargement" must be mentioned. Whereas students' conceptions were investigated almost exclusively at the beginning of the research area some 10 to 15 years ago, teachers' conceptions are now increasingly being taken into consideration (namely teachers' conceptions in a very broad sense, i. e. conceptions in specific content areas, conceptions of science and conceptions of teaching and learning).

The trend towards a broader investigation of conceptions appears to be the most important one in the research area. It is indeed a great challenge to research in our field. On the one hand, considering the entire complexity of school science learning is unavoidable, but on the other hand, research could lose its bearings in the labyrinth of this complexity.

Trend III: Theoretical approaches

Science educators in Germany who started research in the mid 1970s were quite aware that their work was part of a longstanding tradition, namely that of to start instruction with students' preinstructional knowledge, interests and attitudes. There will certainly be similar traditions in other countries. In some way Ausubel's work draws on these traditions. His dictum "The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly" was and still is accepted as motto by most researchers in our field.

It is interesting to look at Piaget's role in our research field because it is quite conflicting. On the one hand all researchers relied heavily upon Piaget. Without Piaget's theoretical ideas, his investigations in so many thematic fields and his method of investigation research would have followed quite different paths. On the other hand research on students' notions was quite often deliberately distinct from Piaget. There was, for instance, in our research field a very general agreement that the contents of specific notions (such as notions of light, heat, burning) are of greater importance for learning processes in science than Piaget's general operations of thinking. Sometimes quite heavy battles were fought between "Piagetians" and "Alternative Frameworkers". But it appears that now most researchers take a more tolerant line, i. e. a position conceding that both general operations of thinking and conceptions (in the above mentioned broad sense) are important aspects in learning science. I think, by the way, that both "parties" have profited considerably from "fighting" one another.

It has been mentioned above that two "groups" started research in our field, namely science educators and cognitive psychologists. The latter group supplied the research field with their theories, e. g. network theories or information processing theories with the computer as paradigm for a learning system.

Without any doubt, the philosophy of science as developed by Hanson, T. S. Kuhn, Feyerabend and Lakatos influenced research considerably. In these approaches there was the idea of theory laden observation and the theory-guided development of learning.

The rapid growth of research on students' conceptions since the mid 1970s is, therefore, due at least in part to the fact that main lines of contemporary thinking were adopted and further developed. Not only the positions of philosophy of science were employed. Research was also implicitly influenced by contemporary science ideas which are known under headings such as self-organisation (in open systems). This is true because there are manifold relations of these lines of thinking with ideas of artificial intelligence which influenced research in our field via the already mentioned approaches of information processing theories. The rediscovery of constructivistic approaches fits in very well with the trend we have outlined. These approaches have considerably influenced research on students' conceptions.

Since the end of the 1970s such constructivistic ideas have been employed in our research field. In the interim many different approaches have found their way onto "the market", ranging from G. Kelly's theory of personal constructs to Vygotsky's approach of social constructivism. To employ such approaches has been quite fruitful. But it cannot be overlooked that the word constructivism (or constructivistic) is sometimes used merely as another label for what has been referred to as the "active" view of learning above. Such a renaming appears to be of very limited use for the progress of research.

BIBLIOGRAPHIE

Dieser Teil der Bibliographie enthält etwa 2000 Artikel, die bis September 1990 aufgenommen worden sind.

BIBLIOGRAPHY

This part of the bibliography contains some 2000 articles entered before September 1990.

g1 ZUM UMFELD DES PROBLEMS "VORSTELLUNGEN DER SCHÜLER" GENERAL CONSIDERATIONNS CONCERNING RESEARCH IN THIS AREA

Abimbola, I.O. (1988). The problem of terminology in the study of student conceptions in science. Science Education 72, 175-184
gl

Adey, P. (1987). A response to "Towards a Lakatosian analysis of Piagetian and alternative conceptions research programm". Science Education 71, 1, 5-7
gl

Adey, P., Shayer, M. (1988). Strategies for meta-learning in physics. Physics Education 23, 97-104
gl

Aebli, H. (1963). Über die geistige Entwicklung des Kindes. Stuttgart: Klett
gl

Aebli, H. (1970). Piaget and beyond. Interchange 1, 12-24
gl

Aebli, H. (1977). Piagets Deutung der kognitiven Entwicklung und ein Gegenmodell des geleiteten Strukturaufbaus. In: Reulecke, H.: Strukturelles Lernen. Hamburg: Hoffmann und Campe, 145-161
gl

Aissen-Crewett, M. (1990). Alltagserfahrung und experimentell-empirische Erfahrung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 362-364
gl

Albert, E. (1979). Can Ausubel's theorie of meaningful learning become an alternative to Piagetian psychology ? Science Education 63, 1, 135-138
gl

Allen, R.D., Donovan, M.P., Statkiewicz, W.R. (1983). Student perceptions of evidence and interpretations. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 79-83
gl

Anadon, M., Desautels, J., Larochelle, M. (1988). La culte de la science. Quebec: Universite Laval, Departement de sociologie
gl

Anamuah-Mensah, J. (1987). Comments on plants as producers: A case study of elementary science teaching. Journal of Research in Science Teaching 24, 8, 769-770
gl

Anderson, C.W. (1987). Three perspectives on cognition and their implications for science teaching. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.
gl

Anderson, C.W., Belt, B.L., Gamalski, J.M., Greminger, J.E. (1987). A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 11-24
gl,g5,g9

Andersson, B.R. (1986). The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 155-171
gl,g6,P,M,E,T,O

Arca, M., Guidoni, P., Mazzoli, P. (1983). Structures of understanding at the root of science education. Part 1: Experience, language and knowledge. European Journal of Science Education 5, 367-375
g1

Arca, M., Guidoni, P., Mazzoli, P. (1984). Strucures of understanding at the root of science eduaction. Part 2: Meanings of formalisation. European Journal of Science Education 6, 311-319
g1

Aufschnaiter, S. von, Fischer, H., Schmidt, D., Schwedes, H. (1990). Ein "konstruktivistisches" Forschungsprogramm zur Untersuchung von Denk- und Lernprozessen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 232-234
g1

Ault, C.R. (1983). Children's intelligently wrong grasp of unobvious meaning. Paper submitted to Science Education, 1-17
g1

Ault, C.R. (1984). Intelligently wrong. Some comments on children's misconceptions. Science and Children 21, 8, 22-24
g1

Ault, C.R. (1987). Interview studies in teacher education: examples from extraordinary contexts. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 25-29
g1,g6,P,O,S

Ausubel, D.P. (1974). Psychologie des Unterrichts. Band 1. Weinheim, Basel: Beltz
g1

Baird, J.R., Mitchell, I.J. (1986). Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery
g1,g6,g8,g9,CTL

Baird, J.R., Mitchell, I.J., Northfield, J.R. (1987). Teachers as researchers: The rationale, the reality. Research in Science Education 17, 129-138
g1,g9

Barbour, B. (1984). Theories of learning: Pask. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 42-63
g1

Benson, G.D. (1987). Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 59-66
g1,g6,g8,CSC

Bethge, T. (1988). Aspekte des Schülervorverständnisses zu grundlegenden Begriffen der Atomphysik - Eine empirische Untersuchung in der Sekundarstrufe II. Bremen: Universität Bremen
g1,g6,P,Q,AT,EN,CSC

Bloom, J.W. (1989). Contexts of meaning: Young children's understanding of biological phenomena. Paper presented at the annual meeting of the Canadian Society for Studies in Education, Quebec City
g1,g6,B

Blosser, P. (1987). Secondary school students' comprehension of science concepts: some findings from misconceptions research. ERIC/SMEAC Education Digest, 2
g1

Bodner, G.M. (1986). Constructivism: A theory of knowledge. Journal of Chemical Education 63, 10, 873-878
g1

Boeha, B.B. (1989). Students' beliefs and the outcomes of physics instruction. Melbourne: Monash University
g1,g5,g6,g7,P,M

Boyes, E. (1988). Catastrophic misconceptions in science education. Physics Education 23, 105-109
g1

Brainerd, C.J. (1980). Lernforschung und Piagets Theorie. 2. Themenheft. physica didactica 7, 2, 47-83
g1

Broudy, H.S. (1979). Tacit knowing as a rationale for liberal education. Teachers College Record 80, 30, 446-462
g1

Brown, A.L. (1978). Knowing when, where, and how to remember: A problem of metacognition. In: Glaser, R.: Advances in instructional psychology. Hillsdale, N.Y.: Lawrence Erlbaum Association, 77-165
g1

Brown, G., Desforges, C. (1977). Piagetian psychology and education: Time for revision. British Journal of Educational Psychology 47, 7-17
g1

Bruhn, J. (1986). Lernschwierigkeiten im Physikunterricht; Modelle und Konsequenzen; Versuch einer systematischen Übersicht. physica didactica 13, 1, 35-47
g1

Buck, P. (1990). Alltagsvorstellungen und naturwissenschaftliches Denken. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 14-47
g1

Buck, P., Redeker, B. (1988). Verstehen lehren - zum Sprung verhelfen. Ein Dialog über das Lernen von Physik bei Martin Wagenschein. chimica didactica 14, 129-154
g1

Candy, P.C. (1989). How people learn to learn. In: Smith, R.M. (Ed.): Learning to learn. Jossey/Bass., 1-35
g1

Carey, S. (1986). Cognitive science and science education. American Psychologist 10, 1123-1130
g1,g3

Case, R. (1974). Structures and strictures: Some functional limitations of the course of cognitive growth. Cognitive Psychology 6, 544-573
g1

Case, R. (1975). Gearing the demands of instruction to the developmental capacities of the learner. Review of Educational Research 45, 59-87
g1

Case, R. (1976). A developmentally based theory and technology of instruction. Toronto, Canada: The Ontario Institute for Studies in Education
g1

Case, R. (1989). Science teaching from a development perspective: The importance of central conceptual skills. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 125-151
g1

Chalouhi, E. (1981). Mecanismes cognitifs utilise' par les eleves et leurs professeurs dans la resolution d'un probleme d'electrocinetique. Role de la conection du probleme, en classe, par les professeurs. Paris: Universite Paris VII, Laboratoire Interuniversitaire de Recherche sur l'Enseignement des Science Physiques et de la Technologie
g1,g6,P,E

Champagne, A.B. (1981). Cognitive research and the design of science instruction. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 387-440
g1

Champagne, A.B. (1986). Science teacher quality: a cognitive perspective. Paper prepared for the Seminar "Improving Teacher Quality in Science and Mathematics". Annual Meeting of AERA, San Francisco, 1-29
g1

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1982). A perspective on the differences between expert and novice performance in solving physics problems. Paper presented at the meeting of the Australian Science Education Research Association, Sydney
g1

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1983). Naive knowledge and science learning. Research in Science and Technological Education 1, 2, 173-183
g1,g6,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Instructional consequences of students' knowledge about physical phenomena. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 61-90
g1,g7,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Effecting changes in cognitive structure among physics students. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 163-187
g1,g5,g6,g7,P,M

Champagne, A.B., Gunstone, R.F., White, R.T. (1979). Knowledge of basic principles of dynamics. Melbourne: Monash University, Faculty of Education
g1,g6,P,M

Champagne, A.B., Klopfer, L.E. (1980). Cognitive science and classroom practice. University of Pittsburgh, Learning Research and Development Center. Paper presented at the Conference on Student Achievement sponsored by the Coalition of Michigan Subject Matter Education Organizations, Lansing, Michigan
g1

Champagne, A.B., Klopfer, L.E. (1980). Using the consat: A memo to teachers. University of Pittsburgh: Learning Research and Development Center
g1,g5

Champagne, A.B., Klopfer, L.E. (1981). Cognitive science and instructional practice. Paper presented at the Seventh International Conference on Improving University Teaching, Tsukuba, Japan
g1

Champagne, A.B., Klopfer, L.E., Anderson, J. (1980). Factors influencing the learning of classical mechanics. American Journal of Physics 48, 1074-1079
g1,g6,g7,P,M

Champagne, A.B., Klopfer, L.E., Desena, A.T., Squires, D.A. (1981). Stuctural representations of students' knowledge before and after science instruction. Journal of Research in Science Teaching 18, 2, 97-111
g1

Champagne, A.B., Klopfer, L.E., Gunstone, F.G. (1981). A model of adolescents' understanding of physical phenomena and its application to instruction. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles
g1

Champagne, A.B., Klopfer, L.E., Gunstone, R.F. (1982). Cognitive research and the design of science instruction. Educational Psychologist 17, 1, 31-53
g1

Champagne, A.B., Klopfer, L.E., Solomon, C.A., Cahn, A.D. (1980). Interactions of students' knowledge with their comprehension and design of science experiments. Pittsburgh: University of Pittsburgh, Learning Research and Development Center
g1

Chi, M.T.H., Feltovich, P.J., Glaser, R. (n.d.). Representation of physics knowledge by experts and novices. University of Pittsburgh, Learning Research and Development Center, Technical Report No.2
g1

Claxton, G.L. (1986). Book reviews: The alternative conceivers conceptions. Studies in Science Education 13, 123-130
g1

Claxton, G.L. (1989). Cognition doesn't matter if you're scared, depressed or bored. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 155-161
g1

Clement, J. (1978). Some types of knowledge used in understanding physics. Massachusetts: University of Massachusetts, Department of Physics and Astronomy
g1

Clement, J. (1981). Analogy generation in scientific problem solving. Proceedings of the Third Annual Meeting of the Cognitive Science Society
g1,g7

Clinchy, B., Rosenthal, K. (1971). Analysis of children's errors. In: Lesser, G.S.: Psychology an educational practice. Glenview, Illinois: Scott, Foresman and Company, 99-129
g1

Cobern, W. (1990). Understanding the world as others do. Newsletter (No.13) of the SIG "Subject Matter Knowledge and Conceptual Change" of the American Educational Research Association
g1

Coles, B. (1984). Theory for teachers; theory for researchers: bridging the gap. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 97-112
g1

Confrey, J. (1983). Implications for teaching from the research on misconceptions. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 21-31
g1

Confrey, J. (1987). "Misconceptions" across subject matter: science, mathematics, programming. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 81-106
g1,g5

Cosgrove, M., Osborne, R., Tasker, R. (1986). Towards generative learning. Working paper (No.205) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g1,g7,OCI

Dawson, C.J. (1978). Pupils difficulties: What can the teacher do ? Education in Chemistry 133, 15, 120-121
g1

De Carcer, I.A., Gabel, D.L., Staver, J.R. (1978). Implications of Piagetian research for High School science teaching: A review of the literatur. Science Education 62, 4, 571-538
g1

Dekkers, J., Malone, J. (1982). The concept map as an aid to instruction in science nad mathematics. Bentley: University of Western Australia, Science nad Mathematics Education Centre
g1,g7

Desautels, J., Larochelle, M. (1989). Qu'est-ce que le savoir scientifique ? Quebec: Les presses de l'Universite Laval
g1

Di Sessa, A.A. (1983). Phenomenology and the evolution of intuition. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 15-33
g1,g6,P,E,M

Di Sessa, A.A. (1985). Knowledge in pieces. Berkeley: University of California
g1,g7

Dreyfus, A., Jungwirth, E. (1989). The pupil and the living cell: a taxonomy of dysfunctional ideas about an abstract idea. Journal of Biological Education 23, 1, 49-55
g1,g6,B,OCI

Driver, R. (1979). The pupil as scientist. Paper presented to the GIREP conference, Rehovot, Israel
g1

Driver, R. (1981). Pupils' alternative frameworks in science. European Journal of Science Education 3, 1, 93-101
g1,g6

Driver, R. (1985). Cognitive psychology and pupils' frameworks in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 171-198
g1,g6,P,M

Driver, R. (1986). The approach of the children's learning in science project. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g1,g7

Driver, R. (1987). Promoting conceptual change in classroom settings: the experience of the Children's Learning in Science Project. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 97-107
g1,g7

Driver, R. (1989). Changing conceptions. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 79-103
g1,g7

Driver, R. (1989). Students' conceptions and the learning of science. International Journal of Science Education 11, 481-490
g1

Driver, R. (1990). Constructivist approaches to science teaching. Paper presented at the University of Georgia, Mathematics Education Department as a contribution to the Seminar Series "Constructivism in Education"
g1

Driver, R., Bell, B. (1986). Students' thinking and the learning of science: a constructivist view. School Science Review 67, 443-456
g1

Driver, R., Easley, J.A. (1978). Pupils and paradigms: A review of literature related to concept development in adolescent science students. Studies in Science Education 5, 61-84
g1,g6

Driver, R., Easley, J.A. (1969). Autonomous dynamical thinking of young adolescent physics students. In: Easley, J.A.: The uses of mathematics in science teaching. Urbana, Illinois: UMIST
g1

Driver, R., Erickson, G.L. (1983). Theories-in-action: Some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 37-60
g1,g5

Driver, R., Guesne, E., Tiberghien, A. (1985). Children's ideas in science. Milton Keynes: Open University Press
g1,g6,g7

Driver, R., Guesne, E., Tiberghien, A. (1985). Children's ideas and the learning of science. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 1-9
g1,g7

Driver, R., Guesne, E., Tiberghien, A. (1985). Some features of children's ideas and their implications for teaching. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 193-201
g1,g7

Driver, R., Guesne, E., Tiberghien, A. (1987). Putting into focus. A response to Guy Claxton's review "The alternative conceivers' conceptions". Studies in Science Education 14, 145-147
g1

Driver, R., Oldham, V. (1985). A constuctivist approach to curriculum development in science. Paper prepared for the Symposium "Personal Construction of Meaning in Educational settings". BERA. Sheffield
g1

Driver, R., Scanlon, E. (1988). Conceptual change in science. Journal of Computer Assisted Learning 5, 25-36
g1

Duit, R. (1985). Research on students' frameworks - report of a closing discussion led by A.C. Paulsen. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 310-311
g1

Duit, R. (1987). Research on students' alternative frameworks in science - topics, theoretical frameworks, consequences for science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 151-162
g1

Duit, R. (1987). Research on students' conceptions in science - perspectives from the Federal Republic of Germany. Paper presented at the Int. Seminar "Adolescent Development and School Science", Sept. 13-17th, King's College London, 1-22
g1

Duit, R. (1989). Research on students conceptions in science - perspectives from the Federal Republic of Germany. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 259-265
g1

Duit, R. (1989). Von Alltagsvorstellungen zur konstruktivistischen Sichtweise - Entwicklungen in einem Forschungsgebiet. In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 40-49
g1

Duit, R. (1989). Vorstellung und Experiment. Naturwissenschaften im Unterricht - Physik/Chemie 37, 37-39
g1

Duit, R. (1990). Trends der Forschung zum naturwissenschaftlichen Denken - Von Alltagsvorstellungen zur konstruktivistischen Sichtweise. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 112-131
g1

Duit, R., (1988). Comments on the papers presented at the symposium "Students' conceptions of subject matter content". In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 121-133
g1

Duit, R., Jung, W., Niedderer, H., Rhöneck, Ch.v. (1987). Misconceptions and educational strategies in science and mathematics. Berichte über eine Internationale Tagung in Ithaca (USA). physica didactica 1987, 14, 37-44
g1

Duit, R., Jung, W., Pfundt, H. (Hrsg.) (1981). Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis
g1

Duit, R., Säljö, R. (1988). Students' conceptions of subject matter content. Proceedings of a symposium at the 2. European Conference on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief
g1

Duschl, R.A. (1990). Guiding science instruction: The use of historical analyses. Paper presented as part of the symposium "Can a logic discovery define strategic knowledge?" at the annual meeting of the American Education Research Association, Boston
g1,g3

Dykstra, D., Schroeder, S. (1987). Published materials in science education: Alternative conceptions and cognitive development. Paper of the Department of Physics, Boise State University
g1

Easley, J.R. (1977). Piaget and education. Paper presented at Jean Piaget Society. Philadelphia, May
g1

Easley, J.R. (1981). The interplay of conflicting schemas in quantitative science. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 453-490
g1

Eger, M. (1987). Philosophy of science in teacher education. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 163-176
g1

Erickson, G.L. (1983). Student frameworks and classroom instruction. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 489-501
g1,g7,B,P,T

Erickson, G.L. (1984). Some issues on cognitive structure and conceptual change in science education: One perspective from North America. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g1

Faucher, G. (1987). Pragmatical conceptions in the atomic domain. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 137-142
g1

Fensham, P.J. (1972). Prior knowledge - a source of negative factors for subsequent learning. In: Tisher, R.P.: Proceedings of the third annual conference of the Australian Science Education Research Association. University of Queensland: University Printers, 50-57
g1

Fensham, P.J. (1989). Theory in practice: How to assist science teachers to teach constructively. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 61-77
g1

Fensham, P.J., Kass, H. (1988). Inconsistent or discrepant events in science instruction. Studies in Science Education 15, 1-16
g1,g4

Fischer, H.E. (1989). Lernprozesse im Physikunterricht. Bremen: Universität Bremen
g1,g5,g6,g7,P,E,OCI

Fischler, H. (1985). Didaktische Theorien und didaktisches Handeln. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 58-75
g1,g8,g9,CTL

Fischler, H. (1986). Schülervorstellungen und Lehrertheorien - Zum Programm einer Rekonstruktion subjektiver Theorien von Physiklehrern. physica didactica 13, 67-79
g1,g8,CTL

Fisher, K.M. (1983). Ten rules of thumb: Information processing interpretations of error research in learning. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 150-152
g1

Fisher, K.M., Lipson, J.F. (1986). Twenty questions about student errors. Journal of Research in Science Teaching 23, 9, 783-803
g1

Fisher, K.M., Lipson, J.I. (1985). Information processing interpretation of errors in college science learning. Instructional Science 14, 49-74
g1

Flavell, J.H. (1976). Metacognitive aspects of problem solving. In: Resnick, L.B.: The nature of intelligence. Hillsdale, N.J.: Lawrence Erlbaum Association
g1

Flavell, J.H. (1977). Cognitive development. Englewood Cliffs, N.J.: Prentice Hall
g1

Flavell, J.H., Wellmann, H.M. (1977). Metamemory. In: Kail, R.V., Hagen, J.W.: Perspectives on the development of memory and cognition. Hillsdale, N.J.: Lawrence Erlbaum Association
g1

Fowler, T.W., Bou Jaoude, S. (1987). Using hierarchial concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 182-186
g1,g7,g9

Francis, R. (1987). Drawing together teaching methods and strategies into a model for science education. Research in Science Education 17, 175-181
g1,g7

Frey, K., Lang, M. (Hrsg.) (1973). Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern, Stuttgart, Wien: Huber
g1

Frey, K., Pfundt, H., Lehrke, M., Bayrhuber, H., Jenelten-Allkofer, C. (1982). Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN
g1,g5,g6,C

Freyberg, P. (1985). Implications across the curriculum. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 125-135
g1

Freyberg, P., Osborne, R. (1985). Assumptions about teaching and learning. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 82-90
g1,g7

Fuller, R.G. (1982). Solving physics problems - how do we do it ? Physics Today 35, 9, 43-47
g1

Gallagher, J.J. (1987). A summary of research in science education - 1985; students' conceptual reasoning. Science Education 71, 3, 307-325
g1

Garrard, J. (1987). Learning in science. Some wider perspectives. Research in Science Education 17, 11-22
g1,g5

Garrison, J.W., Bentley, M.L. (1989). Science Education, conceptual change and breaking with everyday experience. Studies in Philosophy and Education 10, 19-35
g1

Gauld, C.F. (1979). Physics teaching and cognitive functioning. A Neo-Piagetian perspective. The Physics Teacher 17, 8, 513-518
g1

Gauld, C.F. (1987). Student beliefs and cognitive structure. Research in Science Education 17, 87-93
g1

Gauld, C.F. (1988). The "pupil-as-scientist" metaphor in science education. Research in Science Education 18, 35-41
g1

Gil P.D., Carrascosa, A.J. (1985). Science learning as a conceptual and methodological change. European Journal of Science Education 7, 3, 231-236
g1

Gil, P.D. (1987). Differences entre "modeles spontanes", modeles enseignes et modeles scientifiques: quelques implications didactiques. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 118-121
g1,g7

Gil, P.D., Carracosa, A.J. (1987). What to do for science misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 149-157
g1,g3

Gil, P.D., Carrascosa, A.J. (1985). Science learning as a conceptual and methodological change. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 303-309
g1

Gilbert, J.K. (1984). Theories of learning: Kelly. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 19-41
g1

Gilbert, J.K. (1980). The Cognitive-Development Research Seminar, Science and Mathematics Education (University of Leeds, 17-21, September 1979): A personal appreciation. Journal of Research in Science Teaching 2, 191-193
g1

Gilbert, J.K., Osborne, R., Fensham, P.J. (1982). Children's science and its consequences for teaching. Science Education 66, 4, 623-633
g1,g6

Gilbert, J.K., Swift, D.J. (1985). Towards a Lakatosian analysis of the Piagetian and alternative conceptions research programs. Science Education 69, 681-696
g1

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Giordan, A. (1983). Les representations des eleves: outils pour la pedagogie. Cahiers Pedagogiques 214, 26-28
g1,g6,B

Giordan, A. (1985). Des representations des eleves a l'appropriation de quelques concepts scientifiques. In: Giordan, A.: Reconstruire ses savoir. Paris: Messidor, 113-127
g1,g6,B

Giordan, A. (1986). Boire, manger, dormir... Des conceptions des apprenants a leurs utilisations didactiques. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 411-419
g1

Giordan, A. (1987). Bibliographie concernant les recherches sur les conceptions des apprenants en biologie. Annales de didactique des sciences No 2, BIODIC LDES
g1,g6

Giordan, A. (1987). Premodeles et modeles (personells et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 143-149
g1,g3,g6,B
Giordan, A. (1988). From the categorization of learners' conceptions to an optimal didactic environment. Paper presented by the International Union of Biological Sciences, Comission for Biological Education
g1,g7
Giordan, A., Martinand, J.L. (1988). Etat des recherches sur les conceptions des apprenants a propos de la biologie (1). In: Giordan, A., Mathieu, J.L., Viovy, R.: Annales de didactique des sciences (no.2). Rouen: Universite de Rouen, 11-63
g1,g5,g6,B
Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B
Glaser, R., Bassok, M. (1989). Learning theory and the study of instruction. Annual Review of Psychology 40, 631-666
g1
Glaserfeld, E. von (1983). Learning as a constructive activity. In: Ergeron, J.C., Hevscovics, N.: Proceedings of the fifth annual meeting PME-NA. Montreal, 41-69
g1
Glynn, S.M., Britton, B.K., Semrud-Clikeman, M. (1987). Analogical reasoning and problem solving in science textbooks. In: Glover, J.A., Ronning, R.R., Reynolds, C.R.: Handbook of creativity: assessment, research and theory. New York: Plenum
g1,g7
Göbel, R. (1986). Methodische Probleme der Erarbeitung und Festigung qualitativer Merkmale von Begriffen im Physikunterricht. Physik in der Schule 24, 274-281
g1,g4
Goffman, E. (1977). Rahmen-Analyse. Ein Versuch über die Organisation von Alltagserfahrungen. Frankfurt/Main: Suhrkamp
g1
Good, R. (1988). Analysis of student errors in science. Journal of Research in Science Teaching 25, 2, 157-158
g1
Gowin, D.B. (1983). Misconceptions, metaphors and conceptual change: Once more with feeling. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 39-46
g1
Gowin, D.B. (1987). Changing the meaning of experience: empowering teachers and students trough vee diagrams and principles of educating to reduce misconceptions in science and mathematics, a mode of reform. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 233-240
g1
Grandy, R.E. (1990). On the strategic use of history of science in education. Paper presented at the annual meeting of the American Educational Research Association, Boston
g1

Greeno, J.G. (1973). The structure of memory and the process of solving problems. In: Solso, R.L.: Contemporary issues in cognitive psychology - The Layola Symposium. Washington: Winston and Sons, 103-133
g1
Greeno, J.G., Riley, M.S. (1980). Analysis of acquiring strategic knowledge in problem solving. A proposal. Pittsburgh: University of Pittsburgh
g1
Guidoni, P. (1983). Phenomenology of the understanding and misunderstanding of physics. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 411-421
g1
Guidoni, P. (1985). On natural thinking. European Journal of Science Education 7, 133-140
g1
Gunstone, R.F. (1989). A comment on "The problem of terminology in the study of student conceptions in science". Science Education 73, 6, 643-646
g1
Gunstone, R.F., Baird, J.R. (1988). An integrative perspective on metacognition. Australian Journal of Reading 11, 4, 238-245
g1
Gunstone, R.F., Champgane, A.B., Klopfer, L.E. (1981). Instruction for understanding: A case study. The Australian Science Teachers Journal 27, 3, 27-32
g1,g7,P,M
Gunstone, R.F., Northfield, J.R. (1986). Learners - teachers - researchers: Consistency in implementing conceptual change. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g1,g7
Gunstone, R.F., White, R.T., Fensham, P.J. (1988). Developments in style and purpose of research on the learning of science. Journal of Research in Science Teaching 25, 7, 513-529
g1
Hallden, O. (1986). The concept of task as pupils' perceptions of teachers' assinments. Research Bulletins from the Institute of Education, University of Stockholm, Research in Progress Report XII:IV, 1-28
g1
Hartfree, W.E. (1987). Misconceptions in science and mathematics - a view from Britain. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 241-244
g1
Hashweh, M.Z. (1986). Toward an explanation of conceptual change. European Journal of Science Education 8, 3, 229-249
g1
Hashweh, M.Z. (1988). Describtive studies of students' conceptions in science. Journal of Research in Science Teaching 25, 2, 121-134
g1,g5,g6,P,M
Häusling, A. (1986). Was heißt eigentlich Sachlernen ? Sachunterricht und Mathematik in der Primarstufe 14, 7, 7
g1,g4,g7
Häußler, P. (1981). Denken und Lernen Jugendlicher beim Erkennen funktionaler Beziehungen. Ein Beitrag zur Unterrichtsforschung auf der Grundlage formalisierter Theorien des Denkens und Lernens. Bern, Stuttgart, Wien: Huber
g1

Hawkins, D. (1978). Critical barrieres to science learning. Outlook 29, 3
g1
Hawkins, J., Pea, R.D. (1987). Tools for bridging the cultures of everyday and scientific thinking. Journal of Research in Science Teaching 24, 4, 291-307
g1
Hayes, J.R., Simon, H.A. (1974). Understanding written problem instructions. In: Gregg, L.W.: Knowledge and cognition. Potomac Maryland: Erlbaum, 167-200
g1
Head, J. (1986). Research into "alternative frameworks": promise and problems. Research in Science and Technological Education 4, 2, 203-211
g1
Head, J., Sutton, C. (1985). Language, understanding and commitment. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 91-100
g1,g5
Heege, R. (1981). Konvergente Beschreibungen von Bewegungsphänomenen bei Aristoteles und bei Kindern. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: I. Physikalisches Institut, 93-99
g1,g3
Heege, R. (1981). Was bedeutet "aristotelisches Denken" bei Kindern ? physica didactica 8, 209-215
g1,g3
Helm, H. (1983). "Do students understand the nature and role of scientific concepts ?". In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 41-46
g1
Helm, H. (1985). Misconceptions' research: A problem oriented perspective. Paper prepared for the symposium "Perspectives on Cognitive Structure and Conceptual Change" at the annual meeting of the American Educational Research Association, Chicago
g1,g5
Helm, H., Novak, J.D. (Eds.) (1983). Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University
g1,g6
Henckell, H. (1979). Die Entwicklung physikalischer Begriffe im Sachunterricht. In: Härtel, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 58-60
g1
Herron, J.D. (1976). Commentary on "Piagetian cognitive development and achievement in science". Journal of Research in Science Teaching 13, 4, 355-359
g1
Herron, J.D. (1978). Role of learning and development: critique of Novak's comparison of Ausubel and Piaget. Science Education 62, 4, 593-605
g1
Hesse, J.J. (1987). The costs and benefits of using conceptual change teachings methods: a teachers' perspective. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 194-210
g1,g8,CTL
Hewson, M.G. (1985). The role of intellectual environment in the origin of conceptions: An explanatory study. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 153-161
g1,g4,g6,P,T

Hewson, M.G. (1986). The acquisition of scientific knowledge: Analysis and representation of student conceptions concerning density. Science Education 70, 2, 159-170
g1,g6,P,M

Hewson, P.W. (1981). A conceptual change approach to learning science. European Journal of Science Education 3, 4, 383-396
g1

Hewson, P.W. (1981). Aristotle: Alive and well in the classroom ? The Australian Science Teachers Journal 27, 3, 9-13
g1

Hewson, P.W. (1985). Epistemological commitments on the learning of science: Examples from dynamics. European Journal of Science Education 7, 163-172
g1,P,M

Hewson, P.W., Hewson, M.G. (1984). The role of conceptual conflict in conceptual change and the design of science instruction. Instructional Science 13, 1-13
g1

Hewson, P.W., Hewson, M.G. (1988). An appropriate conception of teaching science: A view from studies of science learning. Science Education 72, 5, 597-614
g1

Hewson, P.W., Thorley, N.R. (1989). The conditions of conceptual change in the classroom. International Journal of Science Education 11, 541-553
g1,g7

Hills, G. (1983). Misconceptions misconceived ? Using conceptual change to understand some of the problems pupils have in learning science. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 245-257
g1

Hills, G.L., McAndrews, B. (1987). David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 210-223
g1,g2,g9

Hills, G.L. (1989). Students' "untutored" beliefs about natural phenomena: Primitive science or commonsense ? Science Education 73, 2, 155-186
g1,g4,g5

Holding, B. (1987). Investigation of schoolchildren's understanding of the process of dissolving with special reference to the conservation of matter and the development of atomistic ideas. Leeds: The University of Leeds, School of Education
g1,g3,g6,P,AT,C

Howard, R.W. (1988). Schemata: Implications for science teaching. The Australian Science Teachers Journal 34, 3, 29-34
g1

Inhelder, B., Piaget, J. (1958). The growth of logical thinking from childhood to adolescent. New York: Basic Books
g1

Inhelder, B., Sinclair, H., Bovet, M. (1974). Learning and the development of cognition. New York: Harvard University Press
g1

Jaeckel, K. (1990). Alltagsvorstellungen und Synergetik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 287-289
g1

Jenkins, E.W. (1978). Piaget and school chemistry - a critique. Education in Chemistry 15, 85-86
gl

Johansson, B., Marton, F., Svensson, L. (1985). An approach to describing learning as change between qualitative different conceptions. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 233-266
gl,g5

Jordaan, A.S. (1987). Aspects of the understanding and teaching of the laws of physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 258-267
gl

Jung, C.G., Pauli, W. (1952). Naturerklärung und Psyche. Zürich
gl

Jung, W. (1975). Was heißt Physik lernen ? Didaktik der Physik zwischen Physik und Wissenschaftstheorie. In: Ewers, M.: Naturwissenschaftliche Didaktik zwischen Kritik und Konstruktion. Weinheim: Beltz, 133-158
gl

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (1.Teil). physica didactica 5, 3, 125-146
gl,g5,g6,P,M,EN,OCI

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (2.Teil). physica didactica 5, 4, 231-248
gl,g5,g6,P,M,EN,OCI

Jung, W. (1979). Aufsätze zur Didaktik der Physik und Wissenschaftstheorie. Frankfurt/Main: Diesterweg
gl

Jung, W. (1979). Schülervorstellungen in Mechanik. In: Härtel, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 74-76
gl,g6,P,M

Jung, W. (1980). Vorstellungen der Schüler zu physikalischen Begriffen. Langfassung eines Vortrages am 3.12.1980 an der FU-Berlin
gl

Jung, W. (1981). Introduction to the conference - toward a synthesis of research efforts. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 1-11
gl

Jung, W. (1981). Zum Anfangsunterricht in Optik: Untersuchungen und didaktische Konsequenzen. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: 1. Physikalisches Institut, 433-439
gl,g6,P,O

Jung, W. (1981). Zur Bedeutung der Schülervorstellungen für den Unterricht. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 1-23
gl

Jung, W. (1982). Über die Schwierigkeiten, Physik zu lernen. physica didactica 9, 135-157
gl

Jung, W. (1984). Elementary electricity: An epistemological look at some empirical results. In: Duit, R., Jung, W., Rhöneck, C. von: Understanding electricity - Proceedings of a workshop. Ludwigsburg: Pädagogische Hochschule Ludwigsburg
g1,g7,P,E

Jung, W. (1985). Schülervorstellungen im Physikunterricht - ein didaktisches Problem. physica didactica 12, 4, 11-22
g1

Jung, W. (1985). Uses of cognitive science to science education. Paper presented to the ATEE Symposium on the Implications of Cognitive Science for the Education of Science Teachers, Kiel
g1

Jung, W. (1986). Alltagsvorstellungen und das Lernen von Physik und Chemie. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 2-6
g1,g7

Jung, W. (1986). Cognitive science and history of science. Paper presented at the Munich Conference
g1,g3

Jung, W. (1987). Verständnisse und Mißverständnisse. physica didactica 14, 1/2, 23-30
g1,g5,g6,P,O

Jung, W. (1989). Phänomenologisches vs physikalisches optisches Schema als Interpretationsinstrumente bei Interviews. physica didactica 16, 4, 35-46
g1,g5,g6,P,O

Jung, W. (Hrsg.) (1980). Piaget und Physikdidaktik. physica didactica (Sonderheft) 7
g1

Jung, W., Pfundt, H., Rhöneck, C. von (1981). Problems concerning students' representations of physics and chemistry knowledge. Ludwigsburg: Pädagogische Hochschule
g1

Jung, W., Reul, H., Schwedes, H. (1977). Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg
g1,g6,g7,P,M

Jung, W., Schwedes, H. (1975). Lernschwierigkeiten im Physikunterricht. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 82-90
g1,g6,P,M

Jung, W., Wiesner, H., Engelhardt, P. (1981). Vorstellungen von Schülern über Begriffe der Newtonschen Mechanik. Bad Salzdethfurt: Didaktischer Dienst Franzbecker
g1,g6,P,M

Keating, D.P. (n.d.). Adolescent thinking. In: Adelson, J.P.: Handbook of adolescence. New York: Wiley
g1

Kempa, R.F. (1979). Cognitive psychology in science education - issues for the future. Paper represented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds
g1

Klopfer, L.E (1983). Intelligent tutoring systems in science education. The coming generation of computer-based instructional programs. Journal of Computers in Mathematics and Science Teaching 5, 4, 16
g1,g7

Koballa, T.R., Crawley, F.E., Shrigley, R.L. (1990). A summary of research in Science Education - 1988. Chapter 6: Conceptual Development. Science Education 74, 3, 315-333
gl

Köhnlein, W. (1990). Sachunterricht als Entwicklung von Schülervorstellungen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 359-361
gl

Kubli, F. (1974). Die Bedeutung der Psychologie Piagets für den Physikunterricht. Der mathematische und naturwissenschaftliche Unterricht 27, 44-46
gl

Kubli, F. (1979). Piaget's cognitive psychology and its consequences for the teaching of science. European Journal of Science Education 1, 1, 5-20
gl

Kubli, F. (1980). Was kann Piagets Erkenntnispsychologie für den Physikunterricht leisten ? Polyskript
gl

Kubli, F. (1981). Piaget und Naturwissenschaftsdidaktik. Köln: Aulis
gl

Kubli, F. (1981). Piaget's clinical experiments and some conclusions for science teaching. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 92-105
gl,g5

Kubli, F. (1983). Erkenntnis und Didaktik - Piaget und die Schule. München: Reinhardt
gl

Kuhn, C., Aguirre, J. (1987). A case study an the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 262-274
gl,g5,g7

Künzli, R. (1982). Von sinnlichen Vorstellungen zu deutlichen Begriffen. Vortrag auf dem IPN-Seminar, Kiel, 26. Sept. 1982
gl

Künzli, R. (1988). Von sinnlichen Vorstellungen zu deutlichen Begriffen. In: Otto, G., Sauer, M., Friedrich, E.: Bildung - Die Menschen stärken, die Sachen klären.. Velber: Friedrich , 80-81
gl

Lamb, C.E. (1983). "Do they hear what I say ? - And do they understand what I mean ?". In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 93-99
gl

Larkin, J.H. (1977). Problem solving in physics. Berkeley: University of California
gl

Larkin, J.H. (1979). Skill acquisition for solving physics problems. Pittsburgh: Carnegy Mellon University
gl

Larkin, J.H. (1981). Cognition of learning physics. American Journal of Physics 49, 534-541
g1,g6,P,M

Larkin, J.H. (1983). The role of problem representation in physics. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 75-98
g1,g6,P,M

Larkin, J.H., McDermott, J., Simon, D.P., Simon, H.A. (1979). Expert and novice performance in solving physics problems. Department of Psychology, Carnegy Mellon University, Working Paper No. 410
g1

Larkin, J.H., McDermott, J., Simon, D.P., Simon, H.A. (1979). Models of competence in solving physics problems. Department of Psychology, Carnegy Mellon University
g1

Larochelle, M., Desautels, J. (1987). Connaissance, representation et apprentissage. Qu'est-ce qu'une connaissance dite scientifique ? Prospectives, 163-171
g1

Larochelle, M., Desautels, J. (1988). A propos de la nature du savoir scientifique et de son proces: Les models epistemologiques spontanes des adolescent-E-S. Quebec: Universite Laval
g1

Lawson, A.E. (1988). The acquisition of biological knowledge during childhood: cognitive conflict or Tabula Rasa ? Journal of Research in Science Teaching 25, 3, 185-199
g1,g6,B

Lawson, A.E. (1989). Research on advanced reasoning, concept acquisition and a theory of science instruction. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 11-37
g1

Lechner, H. (1990). Alltagsvorstellungen der Schüler und Aneignen von physikalischem Wissen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 48-73
g1

Lehner, H. (1979). Erkenntnis durch Irrtum als Lehrmethode. Bochum: Kamp
g1

Lin, H. (1983). A "cultural" look at physics students and physics classrooms - An example of anthropological work in science education. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 194-213
g1,g2

Linder, C.J. (1990). Is conceptual change something science teachers should be striving for ? Paper presented to the XVIII annual conference of the Canadian Society for the Study of Education, Victoria
g1,g5,g6,P,S

Linn, M.C. (1979). Theoretical and practical significance of formal thought: some considerations. Paper presented at the Society for Research in Child Development Meeting. San Francisco, California
g1,g6

Linn, M.C. (1980). When do adolescents reason ? European Journal of Science Education 2, 4, 429-440
g1,g6

Linn, M.C. (1982). Theoretical and practical significance of formal reasoning. Journal of Research in Science Teaching 19, 9, 727-742
g1

Linn, M.C., Pulos, S., Gans, A. (1981). Correlates of formal reasoning: content and problem effects. Journal of Research in Science Teaching 18, 5, 435-447
g1

Lippert, R. (1987). Development of expert systems: an instructional strategy for dealing with misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 275-288
g1

Lochhead, J. (1983). Beyond Emile - misconceptins for education in the twenty-first century. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g1,g7

Löffler, G., Köhnlein, W. (1985). Weg in die Naturwissenschaften - ein bruchloser Weg ? physica didactica 12, 4, 39-50
g1

Lott, G.W., Smith, E.L. (1983). Teaching for conceptual change: Some ways of going wrong. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 57-66
g1

Lovell, K. (1974). Intellectual growth and understanding science. Studies in Science Education 1, 1-19
g1

Lovell, K. (1980). The relevance of cognitive psychology. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 1-20
g1

Lunzer, E.A. (1971). On children's thinking. Publicated for the NFER in England and Wales
g1

Lybeck, L. (1979). Forschungs- und Entwicklungsarbeit (FuE) aus einer aktuellen fachmethodischen Forschungsperspektive in Schweden gesehen. Göteborg: University of Göteborg, Institute of Education
g1

Lybeck, L. (1985). Research into science and mathematics education at Göteborg. Mölndal: Gothenburg University, Department of Education and Educational Research
g1,g6,P,M

Lythott, J. (1983). "Aristotelian" was given as the answer, but what was the question ? In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 257-265
g1,g3

Mahadeva, M.N. (1983). Misconceptions and myths masquerading as biological facts. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 266-271
g1

Mahadeva, M.N. (1989). From misinterpretations to myths. The Science Teacher 56, 4, 33-35
g1

Maichle, U. (1981). Beiträge der kognitiven Psychologie zur Analyse von Vorstellungen. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 24-63
g1

Maichle, U. (1985). Wissen, Verstehen und Problemlösen im Bereich der Physik. Frankfurt/Main: Lang
g1,g6,P,E

Maichle, U. (1986). Wissen und Verstehen im Physikunterricht: Diagnose auf kognitionspsychologischer Grundlage. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 53-65
g1,g5

Maloney, D.P. (1987). Cognitive physics education research - a bibliography/2nd ed. Physics Department. Indiana University-Purdue University at Fort Wayne
g1

Maloney, D.P. (1984). Cognitive physics educational research - a bibliography. Creighton, Omaha: University of Craighton, Physics Department
g1,g6,g7,P

Martinand, J.L. (1988). Recherches et innovations pour l'education scientifique formelle. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique. , 51-61
g1

Martinand, J.L., Giordan, A. (1989). French research in science education. Studies in Science Education 16, 209-217
g1

Marton, F. (1981). Phenomenography - describing conceptions of the world around us. Instructional Science 10, 177-200
g1,g5

Marton, F., Neuman, D. (1989). Constructivism and constitutionalism. Some implications for elementary mathematics education. Scandinavian Journal of Educational Research 33, 1, 35-46
g1

Masters, G.N. (1987). New views of student learning: implications for educational measurement. Melbourne: University of Melbourne, Centre for the Study of Higher Education
g1,g5

Mayer, M. (1986). La technologie employee dans la vie quotidienne. Influence-t-elle et vie quotidienne. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 451-458
g1,g6

McClelland, J.A.G. (1983). Alternative model for the development of frameworks of concepts and implications for instruction in sciene. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 98-99
g1

McClelland, J.A.G. (1984). Alternative frameworks: Interpretation of evidence. European Journal of Science Education 6, 1, 1-6
g1

McNaught, C. (1987). Science concept development in a developing country context. Paper presented at the Ass. of Sc. Ed. Annual Meeting, Cardiff
g1,g4

Mehl, M.C., Volmink, J.D. (1983). Influence of cognitive instruction on misconceptions in physics and mathematics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 226-233
g1

Mestre, J., Touger, J. (1989). Cognitive research - What's in it for physics teachers ? The Physics Teacher 27, 9 , 447-456
g1.g7,P

Millar, R. (1989). Constructive criticisms. International Journal of Science Education 11, 587-596
g1

Millar, R., Driver, R. (1987). Beyond processes. Studies in Science Education 14, 33-62
g1

Mitzkat, H. (1989). Piaget und die Inhalte - Anmerkungen zur kritischen Sicht der Physikdidaktik. In: Kriesel, P.; Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 89-95
g1

Mothes, H. (1956). Wie werden Naturerscheinungen vom Kinde selbst gedeutet ? Zeitschrift für Naturlehre und Naturkunde 4, 54-57
g1,g6

Nachtigall, D. (1979). Physikunterricht und die Entwicklung von Denkstrukturen. Naturwissenschaften im Unterricht - Physik/Chemie 27, 65-74
g1

Nachtigall, D. (1986). Die Rolle von Präkonzepten beim Lehren und Lernen von Physik. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 97-101
g1

Niedderer, H. (1982). Probleme der Lebenswelt/Vorverständnis der Schüler und Wissenschaftstheorie der Physik als Determinante für den Physikunterricht. In: Fischler, H.: Lehren und Lernen im Physikunterricht. Köln: Aulis, 105-132
g1

Niedderer, H. (1987). A teaching strategy based on students' alternative frameworks-theoretical concepts and examples. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 360-367
g1,g7,P,M

Niedderer, H. (1987). Schülerzentrierter Physikunterricht in der Sekundarstufe II - Methodisches Konzept, empirisches Forschungsprogramm und Erfahrungen aus dem Unterricht. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1987 in Berlin. Gießen: DPG Fachausschuß Didaktik der Physik, 455-468
g1

Niedderer, H. (1988). Schülervorverständnis und historisch-genetisches Lernen mit Beispielen aus dem Physikunterricht. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 76-107
G1,G7

Niegemann, H.M. (1978). Lehren und Lernen von Begriffen im Unterricht. Saarbrücken: Universität Saarbrücken
g1

Northfield, J., Gunstone, R.F. (1983). Research on alternative frameworks: Implications for science teacher education. Research in Science Education 13, 185-191
g1

Northfield, J., Gunstone, R.F. (1985). Understanding learning at the classroom level. Research in Science Education 15, 18-27
g1,g7

Novak, J.D. (1977). A theory of education. Ithaca, N.Y.: Cornell University Press
g1

Novak, J.D. (1977). An alternative to piagetian psychology for science and mathematics education. Science Education 61, 453-477
g1

Novak, J.D. (1977). Epicycles and the homocentric earth: or what is wrong with stages of cognitive development ? Science Education 61, 393-395
g1

Novak, J.D. (1978). An alternative to Piagetian psychology for science and mathematics education. Studies in Science Education 5, 1-30
g1

Novak, J.D. (1978). Editorial comment on "Implications of Piagetian research for high school science teaching: A review of the literatur". Science Education 62, 4, 591-592
g1

Novak, J.D. (1979). Methodological issues in investigating learning. Paper represented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds
g1

Novak, J.D. (1979). Response to "Can Ausubel's theorie of meaningful learning become an alternative to Piagetian psychology ?". Science Education 63, 2, 271-273
g1

Novak, J.D. (1982). Psychological and epistemological alternatives to Piagetian developmental psychology with support from empirical studies in science education. In: Mogdil, S., Mogdil, C.: Consensus and controversy. London: Holt, Rinehart and Wineton, 331-349
g1

Novak, J.D. (1983). Can metalearning and metaknowledge strategies to help students learn how to learn serve as a basis for overcoming misconceptions ? In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 100-111
g1

Novak, J.D. (1985). Metalearning and metaknowledge strategies to help students learn how to learn. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 189-209
g1,g5

Novak, J.D. (1987). Human constructivism: toward a unity of psychological and epistemological meaning making. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 349-360
g1

Novak, J.D. (1987). Proceedings of the 2. International Seminar "Misconceptions and Educational Strategies in Science and Mathematics",Vol. I - III. Ithaca: Cornell University
g1

Novak, J.D. (1989). Concept maps and vee diagrams: Two metacognitive tools to facilitate meaningful learning. Ithaca: Cornwell University. Department of Education
g1,g6

Novak, J.D., Gowin, D.B. (1984). Learning how to learn. Cambridge: Cambridge Univerity Press
g1,g5,g7

Novak, J.D., Symington, D. (1982). Concept mapping for curriculum development. V.I.E.R. Bulletine 48, 3-11
g1,g7

Nussbaum, J. (1980). Towards the diagnosis by science teachers of pupils' misconceptions: an exercise with student teachers. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 260-272
g1

Nussbaum, J. (1981). Towards the diagnosis by science teachers of pupils' misconceptions: an exercise with student teachers. Journal of Research in Science Teaching 3, 159-169
g1

Nussbaum, J. (1989). Classroom conceptual change: philosophical perspectives. International Journal of Science Education 11, 530-540
g1,g3

Nussbaum, J., Giami, S. (1987). The physico-chemical reduction of life: paradigm, biologists and human values. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 361-372
g1

Oakes, M.E. (1947). Children's explanations of natural phenomena. New York: Columbia University, Teachers College
g1,g6

Ogborn, J. (1985). Understanding students' understanding. European Journal of Science Education 7, 141-150
g1,g6,P,M

Olson, J. (1988). Computer based learning and conceptual change. In: Olson, J.: Schoolworlds/Microwords: Computers and the culture of the classroom. Oxford: Pergamon Press, 59-86
g1

Olson, J. (1989). Computer simulation and conceptional change. Newsletter: Cognitive Structure and Conceptual Change. A special interest group of the American Educational Research Association, 10
g1

Olstad, R.G., Haury, D.L. (1984). A summary of research in science education - 1982, "Conceptual Understanding". Science Education 68, 219-222, 315-363
g1,g6

Osborne, R. (1980). Some aspects of the student's view of the world. Research in Science Education 10, 11-18
g1

Osborne, R. (1984). Theories of learning: Wittrock. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 6-18
g1

Osborne, R., Bell, B. (1983). Science teaching and children's views of the world. European Journal of Science Education 5, 1, 1-14
g1

Osborne, R., Freyberg, P. (1985). Roles for the science teacher. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 91-99
g1,g7

Osborne, R., Freyberg, P. (Eds.) (1985). Learning in science. The implications of children's science. Auckland: Heinemann
g1

Osborne, R., Freyberg, R. (1985). Children's science. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 1-14
g1,g5

Osborne, R., Gilbert, J. (Ed.) (1984). Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato
g1

Osborne, R., Tasker, R. (1985). Introducing children's ideas to teachers. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 136-148
g1,g7

Osborne, R., Wittrock, M.C. (1985). The generative learning model and its implications for science education. Studies in Science Education 12, 59-87
g1

Osborne, R., Wittrock, M.C. (1983). Learning science: A generative process Science Education 67, 4, 489-508
g1

Paoloni, L. (1982). Classical mechanics and quantum mechanics: An elementary approach to the comparison of the two viewpoints. European Journal of Science Education 4, 3, 241-251
g1

Parsons-Chatman, S. (1989). The development of a model of tinkering: A study of children' s science. Paper presented at the annual meeting of the Canadian Association for Curriculum Studies. Canadian Society for Studies in Education. Quebec City
g1,g6

Perkins, D.N., Simmons, R. (1987). Patterns of misunderstanding: an integrative model of misconceptions in science, math and programming. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 381-395
g1

Perkins, D.N., Simmons, R. (1988). Patterns of misunderstanding: An integrative model for science, math, and programming. Review of Educational Research 58, 3, 303-326
g1

Piaget, J. (1950). Psychologische Betrachtungen über den Unterricht der Naturwissenschaft an der Grundschule. Pädagogischer Wegweiser III, Sonderheft
g1

Piaget, J. (1971). The childs conception of the world. London: Routledge & Kegan Paul
g1

Piaget, J. (1972). Intellectual evolution from adolescence to adulthood. Human Development 15, 1-12
g1

Piaget, J. (1973). Die Entwicklung des Erkennens II. Das physikalische Denken. Stuttgart: Klett
g1,g6,P

Piaget, J. (1974). Understanding causality. New York: W.W. Norton & Co. Inc.
g1

Piaget, J., Inhelder, B. (1972). Die Psychologie des Kindes. Olten, Freiburg/Brsg.: Walter
g1

Pines, L. (1985). Towards a taxonomy of conceptual relations and the implications for the evaluation of cognitive structure. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 101-116
g1,g4

Pines, L., West, L. (1983). A framework for conceptual change with special reference to misconceptions. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 47-52
g1

Pines, L., West, L. (1986). Conceptual understanding and science learning: An interpretation of research within a sources of knowledge framework. Science Education 70, 5, 583-604
g1

Pope, M. (1985). Constructivist goggles: Implications for process in teaching and learning. Paper presented at BERA Conference, Sheffield
g1

Pope, M. (1989). The construing teacher. In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 96-101
g1,g9

Pope, M., Gilbert, J. (1983). Personal experience and the construction of knowledge in science. Science Education 67, 2, 193-203
g1

Pope, M., Gilbert, J. (1988). Students' conceptions: themes and variations. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 85-120
g1,g5

Pope, M., Watts, M., Gilbert, J. (1983). Constructive educational research. Paper presented at the 9th annual conference of the BERA, London
g1,g5

Posner, G.J. (1983). A model of conceptual change: Present status and prospect. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 53-56
g1

Posner, G.J., Strike, K.A., Hewson, P.W., Gertzog, W.A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. Science Education 66, 2, 211-227
g1

Preece, P.F.W. (1976). A note on the comparison of cognitive and subject-matter structure. Journal of Research in Science Teaching 3, 353
g1

Preece, P.F.W. (1978). Exploration of semantic space. Review of research on the organisation of scientific concepts in semantic memory. Science Education 62, 547-562
g1,g5

Preece, P.F.W. (1984). Intuitive science: Learned or triggered ? European Journal of Science Education 6, 1, 7-10
g1,g3

Pulos, S.M., Linn, M.C. (1977). Formal operations and group differences: fact or artifact? Proceedings of the Eighth Annual UAP-USC Conference on Piaget and the Helping Professions
g1

Raghubir, K.P. (1979). The effects of prior knowledge of learning outcomes on student achievement and retention in science instruction. Journal of Research in Science Teaching 16, 4, 301-304
g1

Redeker, B. (1981). Zur Bedeutung des Vorverständnisses für das Lernen von Physik. physica didactica 8, 107-120
gl
Redeker, B. (1983). Zum Anfang des Physiklernens. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: I. Physikalisches Institut, 358-367
gl,g2
Redeker, B. (1985). Bemerkungen zur Einleitung zu den Referaten von G. Löffler und W. Köhnlein in "physica didactica", Heft 4, 1985. physica didactica 13, 2/3, 34
gl
Redeker, B. (1985). Die Vorstruktur des Verstehens und das Lernen von Physik. Vortrag, gehalten auf dem Symposium "Lebenswelt und Lernen von Physik", Bad Honnef
gl
Redeker, B. (1985). Zur Lehrbarkeit der Physik. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1985. München: DPG Fachausschuß Didaktik der Physik, 509-527
gl
Reed, J.L. (1976). Kinder erklären Naturphänomene. In: Halbfas, H., Maurer, M., Popp, W.: Neuorientierung des Primarbereiches. Band 4: In Modellen denken. Stuttgart: Klett, 32-65
gl
Reif, F. (1979). Cognitive mechanisms facilitating human problem solving in a realistic domain: the example of physics. Berkley: University of California. Physics Department and Group in Science and Mathematics Education
gl
Reif, F. (1981). Knowledge structure and problem solving in physics. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 12-78
gl
Reif, F. (1983). Understanding and teaching problem solving in physics. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures
gl
Reif, F. (1985). Acquiring an effective understanding of scientifique concepts. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 133-151
gl
Reif, F. (n.d.). Acquiring an effective understanding of scientific concepts. Physics Department and Group in Science and Mathematics Education. University of California, Berkeley, California 94720
gl
Renner, J.W. (1976). Significant physics content and intellectual development. Physics Education 11, 458
gl
Resnick, L.B. (1983). Mathematics and science learning: A new conception. Science 220, 2
gl
Resnick, L.B. (n.d.). The role of invention in the development of mathematical competence. In: Kluwe, R., Spada, H.: Developmental models of thinking. New York: Academic Press
gl

Rhöneck, C. von, Grob, K. (1988). Der Zusammenhang zwischen Leistungswerten und psychologischen Variablen. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen . Gießen: DPG Fachausschuß Didaktik der Physik, 212-223
g1,g6,P,E

Rhöneck, C. von, Grob, K. (1988). Psychological aspects of learning about basic electricity. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 166-181
g1,g6,P,E

Rhöneck, C. von, Grob, K. (1989). Psychologische Aspekte des Lernens in der einfachen Elektrizitätslehre. physica didactica 16, 1, 41-54
g1,g6,P,E

Richardson, M. (1987). Teachers as learners: images from the past and implications of a (generative) constructivist perspective for the future. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 378-389
g1,g9

Riley, M.S. (1981). Representations in early learning: The aquisition of problem-solving strategies in basic electricity/electronics. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 107-173
g1

Ross, K.A. (1982). Concept profiles and the cultural context. European Journal of Science Education 4, 3, 311-323
g1

Rost, J. (1983). Network theories of semantic memory and their implications for teaching physics. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 185-211
g1

Roth, C., Chaiklin, S. (1987). Emerging consensus in novice physics problem solving research. Paper presented at the annual meeting of AERA, Washington D.C.
g1

Rowell, J.A., Dawson, C.J. (1985). Equilibration, conflict and instruction: A new class-oriented perspective. European Journal of Science Education 7, 331-334
g1,g7

Rowell, J.A., Dawson, C.J. (1989). Towards an integrated theory and practice for science teaching. Studies in Science Education 16, 47-73
g1

Rowell, J.A., Dawson, C.J., Lyndon, H. (1990). Changing misconceptions: a challenge to science educators. International Journal of Science Education 12, 2, 167-175
g1,g7,P,M

Russel, D.H. (1956). Children's thinking. Waltham, Mass.: Blaisdell
g1

Säljö, R. (1988). Students' conceptions of subject matter - a research perspective. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 135-140
g1

Schaefer, G. (1979). Concept formation in school between scientific and community demands. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds
gl

Schaefer, G. (1980). Inclusive thinking with inclusive concepts. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 382-396
gl

Schaefer, G. (1984). Naturwissenschaftlicher Unterricht auf dem Wege vom exklusiven zum inklusiven Denken. Der mathematische und naturwissenschaftliche Unterricht 37, 324-336
gl

Schäfer, K. (1985). Zur Bedeutung von Schülervorstellungen für den Physikunterricht. Schriften des Deutschen Vereins zur Förderung des mathematischen und naturwissenschaftlichen Unterrichts 33, 7-17
gl,g6,P,M

Scharf, V., Fuchs, H.M. (1990). Wissenschaftstheoretisch und psychologisch begründete Modelle als Basis für Forschungsvorhaben über Beziehungen zwischen Alltagsvorstellungen und Theorien der Wissenschaft Chemie. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 178-180
gl

Schecker, H. (1985). Das Schülerverständnis zur Mechanik. Bremen: Universität Bremen
gl,g6,P,M

Schmidt, D. (1989). Zum Konzeptwechsel: Eine Untersuchung über den Konzeptwechsel am elektrischen Stromkreis. Frankfurt/Main: Peter Lang
gl,g6,g7,P,E,OCI

Schön, L., Fedra, R.D. (1987). Beschreibt Physik eigentlich das, was wir wahrnehmen ? In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchtturm, 231-234
gl

Sebastia, J.M. (1987). Cognitive constraints and spontaneous interpretations in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 405-412
gl

Sebastia, J.M. (1989). Cognitive constraints and spontaneous interpretations in physics. International Journal of Science Education 11, 4, 363-369
gl

Sen'ko, Iu.V. (1973). Correcting the prescientific conceptions of schoolchildren. Soviet Education 16, 152-156
gl

Shayer, M. (1980). The match of science curriculum to the learner in the middle and secondary school. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 62-79
gl

Shayer, M. (1988). Can cognitive acceleration be produced and can it be measured. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 182-207
gl

Shayer, M. (1989). Hewers of wood and drawers of water ? Or Populations in change ? In: Adey, P.: Adolescent development and school science. London: Falmer Press, 39-59
g1

Shuell, T. (1987). Cognitive psychology and conceptual change: implications for teaching science. Science Education 71, 2, 239-250
g1

Shuell, T.J. (1985). Knowledge representation, cognitive structure and school learning: A historical perspective. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 117-130
g1,g5

Siegel, L.S., Brainerd, C.J. (Eds.) (1978). Alternatives to Piaget. Critical essays on the theory. New York: Academic Press
g1

Simon, H.A., Hayes, J.R. (1976). The understanding process: Problem isomorphs. Cognitive Psychology 8, 165-190
g1

Simpson, M. (1985). Diagnostic assessment and its contribution to pupils' learning. In: Brown, S., Munn, P.: The changing face of education 14 to 16: curriculum and assessment. : NFER-Nelson, 69-81
g1,g7

Simpson, M. (1986). Inside the secondary school classroom. Inspectorate Bulletin/Scottish Education Department
g1

Simpson, M. (1987). Suspect psychology in science education. Times Educational Supplement, Apr. 3rd
g1

Simpson, M., Arnold, B. (1983). Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 36-42
g1,g6,g7,B

Smedslund, J. (1961). The aquisition of conservation of substance and weight in children. Scandinavian Journal of Psychology 2, 11-20, 71-84, 85-87, 153-155, 156-160, 203-210
g1

Smith, E.L. (1987). What besides conceptions needs to change in conceptual change learning? In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 424-433
g1

Solomon, J. (1983). Thinking in two worlds of knowledge. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 127-133
g1

Solomon, J. (1984). Promts, cues and discrimination: the utilization of two seperate knowledge systems. European Journal of Science Education 6, 277-284
g1,g6,P,EN

Solomon, J. (1987). Social effects and personal cognitive style. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 448-455
g1

Solomon, J. (1987). Social influences on the construction of pupils' understanding of science. Studies in Science Education 14, 63-82
g1,g4

Solomon, J. (1989). Social influence or cognitive growth. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 195-199
g1,g7,P,E,O

Spada, H. (1976). Modelle des Denkens und Lernens. Bern, Stuttgart, Wien: Huber
g1

Spada, H., Kluwe, R. (n.d.). Two models of intellectual development and their reference to the theory of Piaget. In: Kluwe, R., Spada, H.: Development models of thinking. New York: Academic Press
g1

Spada, H., Reimann, P., Häußler, B. (1982). Hypothesen im Prozeß des Wissenserwerbs: Eine entwicklungspsychologische Analyse. Forschungsberichte des Psychologischen Instituts der Universität Freiburg, Nr.1
g1

Spreckelsen, K. (1975). Analyse und didaktische Aufbereitung von Begriffen. In: Frey, K. u.a.: Curriculumhandbuch, Band 2. München: Piper, 76-84
g1

Spreckelsen, K. (1986). Schülervorstellungen im Grundschulalter. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 103-108
g1,g6,P

Spreckelsen, K. (Hrsg.) (1985). Schülervorstellungen im Sachunterricht der Grundschule - Vorträge des 2. Arbeitstreffens zum fächerübergreifenden naturwissenschaftlich-technischen Sachunterricht. Kassel: Gesamthochschule Kassel
g1

Staver, J.R. et al. (1989). A summary of research in science education - 1987. Learners and learning. Science Education 73, 3, 243-269
g1

Stenhouse, D. (1986). Conceptual change in science education: Paradigms and language-games. Science Education 70, 4, 413-425
g1,g4

Stewart, J. (1985). Cognitive science and science education. European Journal of Science Education 7, 1-17
g1

Strauss, S. (1977). Educational implications of v-schaped behavioral growth. A position paper for the Ford Foundation
g1

Strauss, S. (1981). Cognitive development in school and out. Cognition 10, 295-300
g1

Strike, K.A. (1983). Misconceptions and conceptual change: Philosophical reflections on the research program. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 67-78
g1

Strike, K.A. (1987). Toward a coherent constructivism. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 481-489
g1

Strike, K.A., Posner, G.J. (1982). Conceptual change and science Teaching. European Journal of Science Education 4, 3, 231-240
g1

Strike, K.A., Posner, G.J. (1985). A conceptual change view of learning and understanding. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 211-231
g1
Strike, K.A., Posner, G.J. (1990). A revisionist theory of conceptual change. In: Duschl, R.A., Hamilton, R.: Philosophy of science, cognitive science, and educational theory and practice (working title). Albany, NY: To be published by SUNY Press
g1
Strnad, J. (1986). Qualitative und quantitative Gesichtspunkte im Physikunterricht. physica didactica 13, 2/3, 45-50
g1
Stückrath, F. (1956). Die geistige Entwicklung des Kindes in der technischen Wirklichkeit. Westermanns Pädagogische Beiträge 8, 213-218
g1
Suarez, A. (1977). Formales Denken und Funktionsbegriff bei Jugendlichen. Bern: Huber
g1
Sumfleth, E. (1988). Lehr- und Lernprozesse im Chemieunterricht. Frankfurt: Lang
g1,g5,g6,C
Sumfleth, E. (1990). Das Vorwissen der Schüler - eine wesentliche Variable in Problemlöseprozessen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 89-111
g1,g6,C
Sutton, C. (1978). Metaphorically speaking - The role of metaphor in teaching and learning science. An occasional Paper Science Education Series, University of Leicester, School Education
g1
Sutton, C., West, L. (1982). Investigating children's existing ideas about science. A research seminar
g1,g6,CTL
Szekely, L. (1976). Denkverlauf, Einsamkeit und Angst. Experimentelle und psychoanalytische Untersuchungen über das kreative Denken. Bern: Huber
g1
Tamir, P. (1979). Some comments on "methodological issues in investigating learning" by Joseph D. Novak. Paper presented at the "Cognitive Development Resesarch seminar, Science and Mathematics Education", Leeds, September
g1
Tasker, R. (1981). Children's views and classroom experiences. The Australian Science Tachers Journal 27, 3, 33-37
g1,g6,CTL
Tasker, R., Freyberg, P. (1985). Facing the mismatches in the classroom. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 66-80
g1,g7
Tiberghien, A., Weil-Barais, A. (1987). Les modeles spontanes dans la pensee commune et enfantine. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 47-55
g1

Van Oers, B. (1988). Modellen en de ontwikkeling van het (natuur-) wetenschappelijk denken van leerlingen. Tijdrschrift voor Didactiek der β-wetenschappen 6, 2, 115-143
g1,g7

Varela, M., Wollman, W. (1987). Improving problem solving in a statewide physics program. Paper presented at the annual meeting of the NARST
g1

Vegting, P. (1988). Zijn misconcepties "mis"-concepties ? NUCN Maandblad 13, 4, 134-137
g1

Vergnaud, G., Halbwachs, F., Rouchier, A. (1978). Structure de la matiere enseignee histoire des science et developement conceptuel chez l'eleve. Revue Francaise de Pedagogie 45, 7-15
g1,g3

Vicentini-Missoni, M. (1979). Common sense knowledge and scientific knowledge. Paper presented at the conference "World Trends in Science Education", Halifax
g1

Vicentini-Missoni, M. (1983). Some issues for discussion from the point of view of science. Proceedings of USA-Italy Joint Seminar on Science Education Research
g1,g2

Viennot, L. (1983). Natural tendencies in analysing students' reasoning two instances in mechanics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 239-244
g1,g6,P,M

Viennot, L. (1985). Analysing students' reasoning in science: A pragmatic view of theoretical problems. European Journal of Science Education 7, 2, 151-162
g1,g5,g6,P,M

Voigt, J. (1990). Die interaktive Konstitution fachlicher Themen im Unterricht. Zum Einfluß von Alltagsvorstellungen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 74-88
g1

Vollmer, G. (1990). Alltagsvorstellungen und naturwissenschaftliches Denken. Erkenntnis- und wissenschaftstheoretische Überlegungen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 132-160
g1

Wagenschein, M. (1970). Was bleibt ? (Verfolgt am Beispiel der Physik). In: Flügge, J.: Zur Pathologie des Unterrichts. Bad Heilbrunn: Klinkhard, 74-91
g1

Wandersee, J.H., Mintzes, J.J., Arnaudin, M.W. (1989). Biology from the learner's viewpoint: A content analysis of the research literature. School Science and Mathematics 89, 8, 654-668
g1

Wason, P.C., Johnson-Laird, P.N. (1972). Psychology of reasoning. B.T. Batsford Ltd.
g1

Waterman, M.A. (1983). Alternative conceptions to the tentative nature of scientific knowledge. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 282-291
g1

Watts, M. (1988). From concept maps to curriculum signposts. Physics Education 23, 74-79
g1

Watts, M., Pope, M. (1985). Modulation and fragmentation: Some cases from science education. Paper presented at the 6th International Congress on Personal Construct Psychology, Cambridge
g1

Watts, M., Pope, M. (1989). Thinking about thinking, learning about learning: constructivism in physics education. Physics Education 24, 326-331
g1

Weinert, F.E. (1977). Entwicklungsgemäßer Unterricht. Unterrichtswissenschaft 5, 1-13
g1

West L., Fensham, P.J. (1974). Prior knowledge and the learning of science. A review of Ausubels' theory of this process. Studies in Science Education 1, 61-81
g1

West, L. (1980). Towards descriptions of the cognitive structures of science students. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 342-348
g1,g5

West, L., Fensham, P.J., Garrard, J.E. (1985). Describing the cognitive structures of learners following instruction in chemistry. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 29-49
g1,g5

West, L., Pines, L. (1983). How "rational" is rationality ? Science Education 67, 37-39
g1

West, L., Pines, L. (1984). An interpretation of research in "conceptual understanding" within a sources-of-knowledge framework. Research in Science Education 14, 47-56
g1

West, L., Pines, L. (Eds.) (1985). Cognitive structure and conceptual change. Orlando, San Diego: Academic Press
g1

Wheeler, A.E. (1983). Misconceptions in elementary science - A Kellyian perspective. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 304-309
g1,g6,P,EN

White, R.T. (1985). The importance of context in educational research. Research in Science Education 15, 92-102
g1

White, R.T. (1987). The future of research on cognitive structure and conceptual change. Paper presented at the annual meeting of the American Educational Research Association, Washington D.C.
g1

White, R.T. (1988). Learning science. New York: Basil Blackwell Inc.
g1

White, R.T., Gunstone, R.F. (1989). Metalearning and conceptual change. International Journal of Science Education 11, 577-586
gl

Wilkening, F., Anderson, N.H. (1980). Comparison of two rule assessement methodologies for studying cognitive development. San Diego: University of California, Center for Human Information Processing
gl

Wittrock, M.C. (1985). Cognitive processes in the learning and teaching of science. Paper presented at the annual meeting of the American Educational Research Association, Chicago
gl

Wittrock, M.C. (1985). Learning science by generating new conceptions from old ideas. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 259-266
gl

Yates, J., Bessman, M., Dunne, M., Jertson, D., Sly, K., Wendelboe, B. (1988). Are conceptions of motion based on a naive theory or on prototypes ? Cognition 29, 251-275
gl,g3

Zietz, K. (1936). Die Physik des Kindes. Die Deutsche Schule 40, 263-269
gl,g6

Zietz, K. (1939). Zur Entwicklung des kausalen Denkens bei Kindern. Zeitschrift für angewandte Psychologie und Charakterkunde 57, 50-58
gl,g6

g2 ALLTAGSVORSTELLUNGEN UND WISSENSCHAFTLICHE VORSTELLUNGEN
EVERYDAY NOTIONS AND SCIENTIFIC NOTIONS

Böhme, G. (1979). Die Verwissenschaftlichung der Erfahrung. Wissenschaftsdidaktische Konsequenzen. In: Böhme, G., Engelhardt M. von: Entfremdete Wissenschaft. Frankfurt/Main: Suhrkamp, 114-136
g2,g3

Dreyfus, A. (1986). L'education scientifique come intermediaire entre la pensee scientifique et la vie de tous les jours: Une role controversable. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 557-564
g2

Fedra, D. (n.d.). Styropor ist warm und Eisen ist kalt - Sinnestäuschung oder physikalische Realität ? Polykop. Gesamthochschule Kassel
g2,g6,P,T

Fedra, D., Schön, L. (1989). Sinneswahrnehmungen und Physik. Physik und Didaktik, 104-123
g2

Gil, P.D., Furio Mas, C. (1986). La vie quotidienne contre la pensee scientifique. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 515-520
g2

Guidoni, P., Vicentini-Missoni, M. (1979). The meaning of the science versus science eduaction: A physics point of view. Accademia Nazionale dei Lincei: Contributi del Centro Linceo Interdisciplinare di Scienze Matematiche e loro Applicazioni, No.44, 125-149
g2

Hewson, M.G., Hamlyn, D. (1984). The influence of intellectual environment on conceptions of heat. European Journal of Science Education 6, 254-262
g2,g6,P,T

Hills, G.L., McAndrews, B. (1987). David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 210-223
g1,g2,g9

Jung, W. (1981). Lebensweltliche und wissenschaftliche Vorstellungen. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 64-84
g2

Lin, H. (1983). A "cultural" look at physics students and physics classrooms - An example of anthropological work in science education. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 194-213
g1,g2

Mayer, M. (1987). Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 299-310
g2,g6,P,AS,M,GEN

Meheut, M., Sere, M.G., Tiberghien, A. (1986). Les etats de la matiere: du vecu a la physique ... et retour. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 121-129
g2

Merten, S. (1970). Das Forschen eines Kindes. Neue Sammlung 4, 427-436
g2

Redeker, B. (1983). Zum Anfang des Physiklernens. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: 1. Physikalisches Institut, 358-367
g1,g2

Rumpf, H. (1976). Schullernen und die Bedrohung der Identität. In: Rumpf, H.: Unterricht und Identität. München: Juvena, 9-28
g2

Sachsse, H. (1976). Was ist die naturwissenschaftliche Bildung ? Der mathematische und naturwissenschaftliche Unterricht 29, 260-271
g2

Schön, L. (n.d.). Beschreibt Physik eigentlich das, was wir wahrnehmen? Polykop. Gesamthochschule Kassel
g2,g3

Solomon, J. (1983). Is physics easy ? Physics Education 18, 155-160
g2,g4

Vicentini-Missoni, M. (1983). Some issues for discussion from the point of view of science. Proceedings of USA-Italy Joint Seminar on Science Education Research
g1,g2

Wagenschein, M. (1970). Der Ruf des Raben. In: Wagenschein, M.: Ursprüngliches Verstehen und exaktes Denken I. Stuttgart: Klett, 16-21
g2

Wagenschein, M. (1973). Kinder auf dem Wege zur Physik. Zusammengetragene Geschichten von Kindern im Vorschulalter. In: Wagenschein, M., Banholzer, A., Thiel, S.: Kinder auf dem Wege zur Physik. Stuttgart: Klett, 6
g2

g3 GESCHICHTLICHE UND INDIVIDUELLE ENTWICKLUNG VON VORSTELLUNGEN DEVELOPMENT OF NOTIONS IN THE HISTORY OF SCIENCE AS COMPARED TO DEVELOPMENT OF NOTIONS IN INDIVIDUALS

Böhme, G. (1977). Thesen zur Schwellenproblematik bei Entstehung und Vermittlung physikalischen Wissens. Unveröffentlichtes Papier zum Werkstattreffen "Schülervorstellungen",IPN, Kiel
g3

Böhme, G. (1979). Die Verwissenschaftlichung der Erfahrung. Wissenschaftsdidaktische Konsequenzen. In: Böhme, G., Engelhardt M. von: Entfremdete Wissenschaft. Frankfurt/Main: Suhrkamp, 114-136
g2,g3

Carey, S. (1986). Cognitive science and science education. American Psychologist 10, 1123-1130
g1,g3

Carr, M., Oxenham, J. (1984). Model confusion in science. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 81-88
g3,g6,C

Clement, J. (1983). A conceptual model discussed by Galileo and used intuitively by physics students. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 325-339
g3,g6,P,M

Duit, R. (1987). Zur Parallelität von Alltagsvorstellungen und Vorstellungen in der Geschichte der Wissenschaften. Vortrag auf der GDCP-Tagung, September 1987, Nürnberg, 1-8
g3

Duschl, R.A. (1990). Guiding science instruction: The use of historical analyses. Paper presented as part of the symposium "Can a logic discovery define strategic knowledge?" at the annual meeting of the American Education Research Association, Boston
g1,g3

Fischbein, E., Stavy, R., Ma-Naim, H. (1987). The psycological structure of naive impetus conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 143-151
g3,g6,P,M

Furio Mas, C.J., Hernandez, J. (1987). Parallels between adolescents' conception of gases and the history of chemistry. Journal of Chemical Education 64, 7, 616-618
g3,g6,P,M,C

Gauld, C.F. (1984). Empirical evidence and conceptual change. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 66-80
g3

Gil, P.D., Carracosa, A.J. (1987). What to do for science misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 149-157
g1,g3

Giordan, A. (1987). Premodeles et modeles (personells et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 143-149
g1,g3,g6,B

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Heege, R. (1981). Konvergente Beschreibungen von Bewegungsphänomenen bei Aristoteles und bei Kindern. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: 1. Physikalisches Institut, 93-99
g1,g3

Heege, R. (1981). Was bedeutet "aristotelisches Denken" bei Kindern ? physica didactica 8, 209-215
g1,g3

Holding, B. (1987). Investigation of schoolchildren's understanding of the process of dissolving with special reference to the conservation of matter and the development of atomistic ideas. Leeds: The University of Leeds, School of Education
g1,g3,g6,P,AT,C

Jung, W. (1986). Cognitive science and history of science. Paper presented at the Munich Conference
g1,g3

Kesidou, S. (1990). Schülervorstellungen zur Irreversibilität. Kiel: Universität Kiel, Mathematisch-Naturwissenschaftliche Fakultät
g3,g5,g6,P,T,EN,IRR,OCI

Lythoth, J. (1985). Aristotelian was given as the answer, but what was the question ? American Journal of Physics 53, 428-432
g3

Lythott, J. (1983). "Aristotelian" was given as the answer, but what was the question ? In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 257-265
g1,g3

Matthews, M.R. (1987). Experiment as the objectification of theory: Galileo's revolution. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 289-298
g3

McCloskey, M. (1983). Naive theories of motion. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 299-324
g3,g6,P,M

Nussbaum, J. (1983). Classroom conceptual change: The lesson to be learned from the history of science. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 272-281
g3

Nussbaum, J. (1989). Classroom conceptual change: philosophical perspectives. International Journal of Science Education 11, 530-540
g1,g3

Piaget, J. (1971). Biology and knowledge. Edinburgh: University Press
g3

Piaget, J. (1972). Physical world of the child. Physics Today 25, 6, 23-27
g3

Piaget, J. (1972). The principles of genetic epistemology. New York: Basic Books
g3

Piaget, J. (1973). Comments on mathematical education. In: Howson, A.G.: Developments in mathematical education. Cambridge: University Press
g3

Preece, P.F.W. (1984). Intuitive science: Learned or triggered ? European Journal of Science Education 6, 1, 7-10
g1,g3

Saltiel, E., Viennot, L. (1985). What do we learn from similarities between historical ideas and the spontaneous reasoning of students ? In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 199-214
g3

Schecker, H. (1987). Zur Universalität des Kraftbegriffs aus historischer Sicht und aus Schülersicht. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1987 in Berlin. Gießen: DPG Fachausschuß Didaktik der Physik, 469-474
g3

Schön, L. (n.d.). Beschreibt Physik eigentlich das, was wir wahrnehmen? Polykop. Gesamthochschule Kassel
g2,g3

Shanon, B. (1976). Aristotelianism, Newtonianism and the physics of the layman. Perception 5, 241-243
g3,g6,P,M

Stork, H. (1985). Zur Rolle der Naturwissenschaftsgeschichte im naturwissenschaftlichen Unterricht, vor allem im Chemieunterricht. Chemiker Zeitschrift 109, 9, 293-301
g3

Van Driel, J., De Vos, W., Verdonk, A.H. (1989). Chemisches Gleichgewicht - Eine empirisch-didaktische Untersuchung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 195-197
g3,g6,C,OCI

Van Driel, J., De Vos, W., Verdonk, A.H. (1989). Leopold Pfaundler, Michael, Karin und das chemische Gleichgewicht. Über eine Beziehung zwischen Chemieunterricht und Geschichte der Chemie. chimica didactica 15, 185-204
g3,g6,C

Vergnaud, G., Halbwachs, F., Rouchier, A. (1978). Structure de la matiere enseignee histoire des science et developement conceptuel chez l'eleve. Revue Francaise de Pedagogie 45, 7-15
g1,g3

Wandersee, J.H. (1985). Can the history of science help science educators anticipate students' misconceptions? Journal of Research in Science Teaching 23, 7, 581-597
g3,g6,B

Wiser, M., Carey, S. (1983). When heat and temperature were on. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 267-297
g3

Yates, J., Bessman, M., Dunne, M., Jertson, D., Sly, K., Wendelboe, B. (1988). Are conceptions of motion based on a naive theory or on prototypes ? Cognition 29, 251-275
g1,g3

g4 SPRACHE UND VORSTELLUNGEN
LANGUAGE AND NOTIONS

Albrecht, E. (1972). Bestimmt die Sprache unser Weltbild ? Kritik der gegenwärtigen bürgerlichen Sprachphilosophie. Frankfurt/Main: Marxistische Blätter
g4

Bach, S. (1984). Systematische und empirische Untersuchungen über das Verhältnis von Umgangssprache und Fachsprache im gymnasialen Physikunterricht. Hamburg: Universität Hamburg
g4

Bach, S. (1987). Syntax-abhängige Auffassungsweisen physikalischer Vorgänge am Beispiel des Leidenfrostschen Phänomens. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1987 in Berlin. Gießen: DPG Fachausschuß Didaktik der Physik, 258-263
g4,g6,P,T

Bach, S. (1987). Zyklische Bedeutungsvertauschung zwischen einigen physikalischen Grundbegriffen - semantische und syntaktische Aspekte des Problems. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchtturm, 223-225
g4

Bach, S. (1988). Quantitative Aussagen über Ursachen kognitiver Defekte durch Verwendung von Fachbegriffen umgangssprachlicher Herkunft. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen. Gießen: DPG Fachausschuß Didaktik der Physik, 207-211
g4

Bell, B., Freyberg, P. (1985). Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 29-40
g4,g5,g7,B

Born, G., Weber, R. (1976). Umgangssprachliche Verwendung physikalischer Begriffe. In: DPG-Fachausschuß Didaktik der Physik: Vorträge auf der Jahrestagung 1976. Gießen: 1. Physikalisches Institut, 280-288
g4,g6

Cassels, J.R.T., Johnstone, A.H. (1983). The meaning of words and the teaching of chemistry. Education in Chemistry 1, 10-11
g4

Drozd, L., Seibicke, W. (1973). Deutsche Fach- und Wissenschaftssprache. Wiesbaden: Brandstetter
g4

Duit, R. (1982). Vom Wort der Alltagssprache zum Fachterminus. Eine empirische Untersuchung zum Erlernen physikalischer Begriffe in der S I. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1982. Gießen: 1. Physikalisches Institut
g4,g6,P,M

Duit, R. (1983). Strom - ein Wort der Alltagssprache und der Fachsprache. Naturwissenschaften im Unterricht - Physik/Chemie 31, 10, 344-347
g4,g6,P,E

Duit, R. (1984). Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. physica didactica 11, 129-144
g4,g6,P,M,EN

Duit, R. (1985). The meaning of current and voltage in everyday language and its consequences for understanding the physical concepts of the electric circuit. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 205-214
g4,g5,g6,P,E

Duit, R. (1985). Work, force and power - words in everyday language and terms in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 227-233
g4,g6,P,M,EN

Duit, R. (1988). Zur Parallelität von Vorstellungen heutiger Schüler und Vorstellungen in der Geschichte der Wissenschaften. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 239-241
G4

Fensham, P.J., Kass, H. (1988). Inconsistent or discrepant events in science instruction. Studies in Science Education 15, 1-16
g1,g4

Gardner, P.L. (1972). Words in science - An investigation of non-technical vocabulary difficulties amongst form I,II,III and IV science students in Victoria. Melbourne: Australian Science Education Project
g4

George, J., Glasgow, J. (1988). Patterns in Caribbean science-related cultural beliefs which may affect learning in school science. Paper presented at the CARIERA/UWI/Bristol Conference, St. Lucia , West Indies
g4,g6,B

George, J., Glasgow, J. (1989). Some cultural implications of teaching towards common syllabi in science: a case study from the Caribbean. School Science Review 70, 254, 115-123
g4,g6,B

Gerlach, W. (1962). Die Sprache der Physik. Bonn: Dümmler
g4

Gipper, H. (1955). Die Farbe als Sprachproblem. Sprachforum, Zeitschrift für angewandte Sprachwissenschaft 1, 135-145
g4

Gipper, H. (1956). Die Kluft zwischen muttersprachlichem und physikalischem Weltbild. Physikalische Blätter 12, 97-105
g4

Gipper, H. (1956). Muttersprachliches und wissenschaftliches Weltbild. Sprachforum, Zeitschrift für angewandte Sprachwissenschaft 2, 1-10
g4

Gipper, H. (1959). Sprache, Schlüssel zur Welt. Düsseldorf: Schwann
g4

Gipper, H. (1964). Muttersprachliche Wirkungen auf die wissenschaftliche Begriffsbildung und ihre Folgen. Archiv für Begriffsgeschichte 9, 243-258
g4

Gipper, H. (1971). Zur Problematik der Fachsprachen. Ein Beitrag aus sprachwissenschaftlicher Sicht. In: Gipper, H.: Denken ohne Sprache ? Düsseldorf: Schwann, 108-123
g4

Gipper, H. (1972). Gibt es ein sprachliches Relativitätsprinzip ? Untersuchungen zur Sapir-Whorf-Hypothese. Frankfurt/Main: Fischer
g4

Göbel, R. (1986). Methodische Probleme der Erarbeitung und Festigung qualitativer Merkmale von Begriffen im Physikunterricht. Physik in der Schule 24, 274-281
g1,g4
Hannaway, O. (1975). The chemists and the word. The didactic origins of chemistry. Baltimore, London: The John Hopkins University Press
g4
Häusling, A. (1986). Was heißt eigentlich Sachlernen ? Sachunterricht und Mathematik in der Primarstufe 14, 7, 7
g1,g4,g7
Heege, R. (1977). Sprachliche Randbedingungen in der Physikdidaktik. physica didactica 4, 79-83
g4
Heege, R. (1979). Sprache - Wahrnehmung - Information und Fachdidaktik. Frankfurt/Main: Lang
g4
Heege, R. (1981). Vorstellung, Reflexion, Intuition und die Genese physikalischer Begriffe. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 132-160
g4
Heisenberg, W. (1960). Sprache und Wirklichkeit in der modernen Physik. In: Bayerische Akademie der Schönen Künste: Wort und Wirklichkeit, 6. Folge des Jahrbuches Gestalt und Gedanke. München: Oldenbourg, 32-62
g4
Heller, B. (1969). Sprachliche und logische Probleme des physikalischen Denkens. Beiträge zum mathematischen und naturwissenschaftlichen Unterricht, 17, 3-27
g4
Henle, P. (Hrsg.) (1975). Sprache, Denken, Kultur. Frankfurt/Main: Suhrkamp
g4
Hewson, M.G. (1985). The role of intellectual environment in the origin of conceptions: An explanatory study. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 153-161
g1,g4,g6,P,T
Hills, G.L.C. (1989). Students' "untutored" beliefs about natural phenomena: Primitive science or commonsense ? Science Education 73, 2, 155-186
g1,g4,g5
Höpp, G. (1970). Evolution der Sprache und der Vernunft. Heidelberg: Springer
g4
Hübner, K. (1979). Über Versuche, aus der Quantenmechanik eine neue Logik herzuleiten. In: Lorenz, K.: Konstruktionen versus Positionen, Band 1. Berlin, New York: de Gruyter, 278-289
g4
Humboldt, W. von (1968). Über die Verschiedenheit des menschlichen Sprachbaues und ihren Einfluß auf die geistige Entwicklung des Menschengeschlechts. Bonn: Dümmler
g4
Jung, W. (1979). Fachdidaktische Aspekte des Kategorienproblems. In: Jung, W.: Aufsätze zur Didaktik der Physik und Wissenschaftstheorie. Frankfurt/Main: Diesterweg, 94-120
g4
Kainz, F. (1966). Das Denken und die Sprache. In: Handbuch der Psychologie: Band 1, 2. Halbband. Göttingen: Verlag für Psychologie, 564-614
g4

Kainz, F. (1972). Über die Sprachverführung des Denkens. Berlin: Duncker und Humblot
g4

Kamlah, W., Lorenzen, P. (1967). Logische Propädeutik oder Vorsschule des vernünftigen Redens. Mannheim: Bibliographisches Institut GA
g4

Kaup-Hartog, G. (1990). Hexa-Cyano-Verrat. Vorstellungen zur chemischen Fachsprache. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 175-177
g4,g6,C

Kenealy, P. (1987). A syntactic source of a common "misconception" about acceleration. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 278-292
g4,g6,P,M

Kubli, F. (1981). Anschauungsmittel und Sprache im Unterricht: eine erkenntnispsychologische Betrachtung. Naturwissenschaften im Unterricht - Physik/Chemie 1, 13-17
g4

Llorens Molina, J., Llopis Castello, R. (1988). Langage quotidien et acquisition des concepts scientifiques. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique. , 107-115
g4,g6,C,OIM

Loch, W. (1970). Sprache. In: Speck, J., Wehle, G.: Handbuch pädagogischer Grundbegriffe, Band II. München: Kösel, 481-528
g4

Logan, P. (1981). Language and physics. Physics Education 16, 74-77
g4

Luther, W. (1970). Sprachphilosophie als Grundwissenschaft. Heidelberg: Quelle & Meyer
g4

Lynch, P.P., Chipman, H.H., Pachaury, A.C. (1984). The language of science and the High School student: The recognition of concept definitions. Journal of Science and Mathematics Education in Southeast Asia 12, 2, 7-14
g4,g6

Matthews, M.R. (1988). A role for history and philosophy in science teaching. Educational Philosophy and Theory 20, 2, 67-81
g4

McNaught, C. (1987). Science concept development in a developing country context. Paper presented at the Ass. of Sc. Ed. Annual Meeting, Cardiff
g1,g4

Mehrle, U. (1990). Nicht immer wenn es funkt muß es Liebe sein ! In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 223-225
g4

Mori, I., Kitagawa, O., Tadang, N. (1974). The effect of language on a child's forming of spatio-temporal concept: On comparing Japanese and Thai children. Science Education 58, 523-529
g4

Mori, I., Kojima, M., Tadang, N. (1976). The effect of language on a child's conception of speed: A comparative study on Japanese and Thai children. Science Education 60, 531-534
g4,g6,P,M

Naumer, H. (1975). "Elektronenwolke "oder "Orbital" ? Praxis der Naturwissenschaften - Chemie 24, 197-207
g4

Nay, U. (1977). Fachspezifische Nomenklatur als Beitrag zur Entfremdung zwischen Kind und Umwelt. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 122-124
g4

Peterson, R.F., Treagust, D.F., Garnett, P.J. (1989). Development and application of a diagnostic instrument to evaluate grade-11 and grade-12 students' concepts of covalent bonding and structure following a course of instruction. Journal of Research in Science Teaching 26, 4, 301-314
g4,g5,g6,C

Pfundt, H. (1981). Die Diskrepanz zwischen muttersprachlichem und wissenschaftlichem "Weltbild": Ein Problem der Naturwissenschaftsdidaktik. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 114-131
g4

Pfundt, H. (1981). Fachsprache und Vorstellungen der Schüler - dargestellt an Beispielen aus dem IPN-Lehrgang "Stoffe und Stoffumbildungen". In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 161-181
g4

Pines, L. (1985). Towards a taxonomy of conceptual relations and the implications for the evaluation of cognitive structure. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 101-116
g1,g4

Rang, O. (1970). Die Sprache als Hindernis beim Verstehen physikalischer Sachverhalte. Physikalische Blätter 26, 241-246
g4

Rang, O. (1975). Zur negativen Transferwirkung von Schultradition und Muttersprache auf das Physikverständnis. Der Physikunterricht 9, 2, 65-71
g4

Rang, O. (1978/79). Die Sprache als Verständigungshindernis in der Physik und Technik. In: Mannheimer Vorträge: Der Mensch - Krone der Schöpfung oder ihr Totengräber ? Mannheim, 4-14
g4

Rapoport, A. (n.d.). Newtons Physik und die Flugschüler. In: Hayakawa, S.: Wort und Wirklichkeit. Darmstadt: Verlag Darmstädter Blätter, 123-146
g4,g6,P,M

Schaefer, G., Loch, W. (1980). Kommunikative Grundlagen des naturwissenschaftlichen Unterrichts. Weinheim und Basel: Beltz
g4

Schulte, W. (1980). Zur Bedeutung der Sprache im Physikunterricht. Untersuchungen über den Einfluß des Unterrichts auf das Verständnis physikalischer Termini. Göttingen: Universität Göttingen
g4,g6

Seiffert, H. (1970). "Verständlichkeit" der Wissenschaft: dialektisch - sprachanalytisch - hermeneutisch. Neue Sammlung 10, 275-289
g4

Solomon, J. (1983). Is physics easy ? Physics Education 18, 155-160
g2,g4

Solomon, J. (1987). Social influences on the construction of pupils' understanding of science. Studies in Science Education 14, 63-82
g1,g4

Spreckelsen, K. (1983). Konzeptdeterminierung und Phänomenorientierung. Zwei widerstreitende Konzeptionen. chimica didactica 9, 75-80
g4

Spreckelsen, K. (1989). Wie begegnen wir neuen Phänomenen ? - Entsprechungen zwischen Grundschülern und Erwachsenen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 107-109
g4

Stenhouse, D. (1986). Conceptual change in science education: Paradigms and language-games. Science Education 70, 4, 413-425
g1,g4

Sutton, C. (1980/81). Science, language and meaning. The School Science Review 62, 47-56
g4

Touger, J.S. (1983). Analyzing the linguistic structure of physical concepts: Possible implications for educational research and for physics pedagogy. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 403-410
g4,g5

Touger, J.S. (1985). A case study in the linguistic structure of physics discourse. Proceedings of the International Conference "Communicating Physics", Duisburg
g4

Vollmer, G. (1977). Über Beziehungen der chemischen Unterrichtssprache zur Gemeinsprache. chimica didactica 3, 9-15
g4

Vollmer, G. (1978). Die Analyse einer Tageszeitung auf ihre chemiefachliche Inhaltskomponente. Naturwissenschaften im Unterricht - Physik/Chemie 26, 280-283
g4

Vollmer, G. (1980). Sprache und Begriffsbildung im Chemieunterricht. Frankfurt/Main: Diesterweg und Sauerländer
g4

Voss, H.P. (1990). Das Problem der Sprache in der Didaktik der Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 248-250
g4,g6,P,E

Wagenschein, M. (1970). Die Sprache im Physikunterricht. In: Wagenschein, M.: Ursprüngliches Verstehen und exaktes Denken, Band 2. Stuttgart: Klett, 158-173
g4

Wagenschein, M. (1971). Naturwissenschaftliche Bildung und Sprachverlust. Neue Sammlung 11, 497-507
g4

Watts, D.M., Gilbert, J.K. (1983). Enigmas in school science: students' conceptions for scientifically associated words. Research in Science and Technological Education 1, 2, 161-171
g4,g6,P,M,EN,OCI

Wein, H. (1960). Srache und Wissenschaft. In: Joachim Jungius-Gesellschaft: Vorträge gehalten auf der Tagung der Joachim Jungius-Gesellschaft der Wissenschaften in Hamburg 1959. Göttingen: Vandenhoeck und Ruprecht, 13-41
g4

Wein, H. (1965). Sprache und Weltbild. Westermanns Pädagogische Beiträge 17, 1-12
g4
Weisgerber, L. (1953). Vom Weltbild der deutschen Sprache. Düsseldorf: Schwann
g4
Weisgerber, L. (1955). Das Warten der Welt als sprachliche Aufgabe der Menschheit. Sprachforum 1, 10-19
g4
Weisgerber, L. (1962). Die sprachliche Gestaltung der Welt. Düsseldorf: Schwann
g4
Weizsäcker, C.F. von (1960). Die Sprache der Physik. In: Joachim Jungius-Gesellschaft: Vorträge gehalten auf der Tagung der Joachim Jungius-Gesellschaft der Wissenschaften in Hamburg 1959. Göttingen: Vandenhoeck und Ruprecht, 137-153
g4
Weninger, J. (1971). Eindeutige Symbole im Chemieunterricht. Der Chemieunterricht 3, 99-118
g4
Weninger, J. (1977). Didaktische und semantische Probleme bei der Einführung der Atom-Hypothese und der Kern-Elektronhypothese. In: Weninger, J., Brünger, H.: Atommodelle im naturwissenschaftlichen Unterricht, Band 1. Weinheim und Basel: Beltz, 35-55
g4
Weninger, J. (1979). Grundsätzliches zu den sogenannten Reaktionsgleichungen. Naturwissenschaften im Unterricht - Physik/Chemie 27, 207-219
g4
Whorf, B.L. (1971). Sprache, Denken, Wirklichkeit. Reinbek: Rowohlt
g4
Wolff, R. (1971). Die Sprache der Chemie vom Atom bis Zyankali. Zur Entwicklung und Struktur einer Fachsprache. Bonn: Dümmler
g4

g5 METHODEN ZUR ERFASSUNG VON VORSTELLUNGEN
METHODS TO INVESTIGATE NOTIONS

Alvarez, M.C., Risco, V.J. (1987). Using vee diagrams to clarify third-grade students' misconceptions during a science experiment. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 6-14
g5,g7

Amir, R., Frankl, D.R., Tamir, P. (1987). Justification of answers to multiple choice items as a means for identifying misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 15-25
g5,g6,B

Anderson, C.W., Belt, B.L., Gamalski, J.M., Greminger, J.E. (1987). A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 11-24
g1,g5,g9

Arzi, H.J. (1988). From short- to long-term: Studying science education longitudinally. Studies in Science Education 15, 17-53
g5

Ault, C.R. (1985). Concept mapping as a study strategy in earth science. Journal of College Science Teaching 15, 38-44
g5

Ault, C.R. (n.d.). Structured interviews and children's science conceptions. Polycop., Indiana University, Bloomington
g5

Ault, C.R., Novak, J.D., Gowin, D.B. (1984). Constructing vee maps for clinical interviews on molecule concepts. Science Education 68, 441-462
g5,g6,P,AT

Bar, V. (1987). The effect of the testing format on the distribution of the results. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 26-31
g5,g6,P,T

Barz, W., Riesch, W., Westphal, W. (1974). Interviews mit Schülern am Beispiel von Untersuchungen von Lernvoraussetzungen für Physikunterricht. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 66-71
g5,g6,P

Bell, B., Freyberg, P. (1985). Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 29-40
g4,g5,g7,B

Bell, B., Osborne, R. (1981). Interviewing children - a checklist for the I.A.I. interviewer. Working Paper No.45, University of Waikato, Learning in Science Project, 1-18
g5

Bell, B., Osborne, R., Tasker, R. (1985). Finding out what children think. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 151-165
g5

Bliss, J., Monk, M., Ogborn, J. (Eds.) (1983). Qualitative data analysis for educational research. Canberra: Croom Helm
g5

Bliss, J., Ogborn, J., Whitelock, D. (1989). Secondary school pupils' commonsense theories of motion. International Journal of Science Education 11, 3, 261-272
g5,g6,P,M

Bloom, J.W. (1990). Methodological perspectives in assessing and extending the scope of children's contexts of meaning: context maps and drawing tasks. Paper presented at the annual meeting of the American Educational Research Association, Boston
g5

Blumör, R., Jung, W., Wiesner, H. (1989). Schülervorstellungen zum Bereich "Sehen und Licht". Ergebnisse schriftlicher und mündlicher Befragungen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 228-230
g5,g6,P,O

Boeha, B.B. (1989). Students' beliefs and the outcomes of physics instruction. Melbourne: Monash University
g1,g5,g6,g7,P,M

Boekaerts, M. (1979). Can the teacher unravel parts of a pupil's cognitive structure. Journal of Experimental Education 48, 1, 4-17
g5

Bowden, J.A., Dall'Alba, G., Laurillard, D., Martin, E., Marton, F., Masters, G.N., Ramsden, P., Stephanou, A., Walsh, E. (1990). Phenomenographic studies of understanding in physics: Displacement, velocity and frames of reference. Paper presented at the annual meeting of the American Educational Research Association, Boston
g5,g6,P,M,OCI

Browning, M. E., Lehmann, J.D. (1988). Identification of student misconceptions in genetics problem solving via computer programs. Journal of Research in Science Teaching 25, 9, 747-761
g5,g6,B

Buck, P. (1985). "Astronomische" Methoden bei Begriffsbildungsuntersuchungen. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 254-256
g5

Butts, B., Smith, R. (1987). HSC chemistry students' understanding of the structure and properties of molecular and ionic compounds. Research in Science Education 17, 192-201
g5,g6,C,OIM,OCI

Cachapuz, A.F.C., Maskill, R. (1987). Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. International Journal of Science Education 9, 4, 491-504
g5,g6,g7,C,P,T

Cachapuz, A.F.C., Maskill, R. (1989). Using word association in formative classroom tests: following the learning of Le Chatelier's principle. International Journal of Science Education 11, 2, 235-246
g5,g6,C

Caillot, M., Chalouhi, E. (1983). Problem solving in electricity. Paper presented at the Annual Meeting of the American Educational Research Association, Montreal
g5,P,E

Calderhead, J. (1986). Developing a framework for the elicitation and analysis of teachers' verbal reports. Paper presented at the Annual Meeting of AERA, San Francisco, 1-15
g5

Caravita, S., Tonucci, F. (1987). Problemes methodologiques dans la recherche sur les representations mentales des enfants de l'ecole primaire sur les themes biologico-naturalistes. Paper presented at the "Le Fonctionemment de l'enfant a l'ecole" Congres International, Universite de Poitiers
g5

Carr, M. (1985). A research method for science education based upon interviews-about-events. Learning in Sciene Project. Working paper No.210. University of Waikato
g5

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Effecting changes in cognitive structure among physics students. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 163-187
g1,g5,g6,g7,P,M

Champagne, A.B., Hoz, R., Klopfer, L.E. (1984). Construct validation of the cognitive structure of physics concepts. Paper presented at the annual meeting of the American Education Research Association, New Orleans
g5

Champagne, A.B., Klopfer, L.E. (1980). Using the consat: A memo to teachers. University of Pittsburgh: Learning Research and Development Center
g1,g5

Clement, J. (1979). Mapping a student's causal conceptions from a problem-solving-protocol. In: Lochhead, J., Clement, J.: Cognitive process instruction. Philadelphia: Franklin Institute Press, 133-146
g5

Cochaud, G.A.M., Thompson, J.J. (1980). Sequencing science material for particular classes. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 368-376
g5

Confrey, J. (1981). Using the clinical interview to explore students' mathematical understandings. Paper presented at annual meeting of the American Educational Research Association, Los Angeles
g5

Confrey, J. (1987). "Misconceptions" across subject matter: science, mathematics, programming. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 81-106
g1,g5

Cosgrove, M., Osborne, R. (1985). Physical change. Learning in Science Project. Working paper No.210. University of Waikato, 28-57
g5,g6,P,M

Dahncke, H., Duit, R., Rhöneck, C. von (1981). Methoden und Zwecke verschiedener Untersuchungen zur Erfassung der Vorstellungen von Schülern - Die Bewegung einer Kugel in gebogenen Bahnen. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 241-280
g5,g6,P,M

De Jong, E.J., Gunstone, R.F. (1988). A longitudinal classroom study of mechanics. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g5,g6,g7,P,M,CTL

Delacote, G. (1980). Classroom based research in science and mathematics education. Response by F.R. Watson, 283-287. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 275-287
g5

Driver, R., Erickson, G.L. (1983). Theories-in-action: Some theoretical and empirical issues in the study of students' conceptual frameworks in science. Studies in Science Education 10, 37-60
g1,g5

Duit, R. (1971). Tests als Hilfsmittel zur statistischen Erfassung von Begriffsstrukturen auf dem Gebiet der Physik. Der Physikunterricht 2, 84-100
g5

Duit, R. (1983). Some methods for evaluating the meaning of concept names. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 141-149
g5

Duit, R. (1985). Students' representations of the topological structure of the simple electric circuit. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 83-93
g5,g6,P,E

Duit, R. (1985). The meaning of current and voltage in everyday language and its consequences for understanding the physical concepts of the electric circuit. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 205-214
g4,g5,g6,P,E

Duit, R. (1989). Konsequenzen der konstruktivistischen Sichtweise für Untersuchungen zu Denk- und Lernprozessen der Schüler. Einleitende Bemerkungen zu einem Workshop auf der GDCP Tagung in Kassel
g5

Duit, R., Jung, W., Rhöneck, C. von (1985). Understanding and teaching electricity - a guide to the workshop's papers. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 9-38
g5,g6,g7,P,E

Dunn, C.S. (1983). The influence of instructional methods on concept learning. Science Education 67, 647-656
g5

Easley, J.R. (1974). The structural paradigm in protocol analysis. Journal of Research in Science Teaching 11, 3, 281-290
g5

Easley, J.R. (1982). Naturalistic case studies exploring social-cognitive mechanisms and some methodological issues in research on problems of teachers. Journal of Research in Science Teaching 19, 191-203
g5

Ellerton, N.F., Ellerton, H.D. (1987). Mathematics and chemical problems created by students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 131-136
g5,g6,C,CSC

Engelhardt, P., Jung, W., Wiesner, H. (1975). Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 249-258
g5,g6,P,M,T

Erickson, G.L. (1984). Theoretical and empirical issues in the study of students' conceptual frameworks. Paper prepared for a conference on The Representation of Cognitive Stuctures held at O.I.S.E.. Toronto, Ontario
g5

Eylon, B.-S., Ben-Zwi, R., Silberstein, J. (1987). Hierarchical task analysis - an approach for diagnosing students' conceptual difficulties. International Journal of Science Education 9, 2, 187-196
g5

Feher, E. (1990). Interactive museum exhibits as tools for learning: explorations with light. International Journal of Science Education 12, 1, 35-49
g5,g7,P,O

Feher, E., Rice, K. (1985). Development of scientific concepts through the use of interactive exhibits in a museum. American Museum of Natural History, 35-46
g5,g6,P,O

Feldsine, J.E. (1983). Concept mapping: A method for detection of possible student misconceptions. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 467-472
g5

Fetherstonhaugh, A.R. (1988). Students' understanding of light: Can teaching for conceptual change lower the level of misconception ? Perth, Western Australia: Curtin University of Technology
g5,g6,g7,P,O,OCI

Finley , F.N. (1984). Using propositions from clinical interviews as variables to compare student knowledge. Journal of Research in Science Teaching 21, 809-818
g5

Finley, F.N. (1984). Students recall from science text. Journal of Research in Science Teaching 21, 247-259
g5

Finley, F.N., Stewart, J. (1982). Representing substantive structures. Science Education 66, 593-611
g5

Fischer, H.E. (1988). Die Rekonstruktion von Denkprozessen - Fallstudien im Physikunterricht zur Elektrostatik und zur elektrischen Spannung. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen . Gießen: DPG Fachausschuß Didaktik der Physik, 513-517
g5,g6,P,E

Fischer, H.E. (1988). Die Rekonstruktion von Denkprozessen. Fallstudien im Physikunterricht zur Elektrostatik und zur elektrischen Spannung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung 1987 in Nürnberg. Alsbach: Leuchtturm-Verlag, 316-319
g5,g6,P,E

Fischer, H.E. (1989). Lernprozesse im Physikunterricht. Bremen: Universität Bremen
g1,g5,g6,g7,P,E,OCI

Forman, G. (1990). Representation and cognitive change in young children. Paper presented at the annual meeting of the American Education Research Association, Boston
g5

Fraser, K., Edwards, J. (1987). Concept maps as reflectors of conceptual understanding. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 187-192
g5,g7

Fredette, N. (1985). The clinical interview: A tool for investigating student knowledge and ideas. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 175-184
g5

Frey, K., Pfundt, H., Lehrke, M., Bayrhuber, H., Jenelten-Allkofer, C. (1982). Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN
g1,g5,g6,C

Garrard, J. (1987). Learning in science: Some wider perspectives. Research in Science Education 17, 11-22
g1,g5

Gilbert, J., Pope, M. (1986). Small group discussions about conceptions in science: a case study. Research in Science and Technological Education 4, 1, 61-76
g5

Gilbert, J.K., Watts, D.M., Osborne, R.J. (1985). Eliciting student views using an interview-about-instances technique. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 11-27
g5

Gilbert, J.R., Osborne, R. (1980). Identifying science students' concepts: The Interview-About-Instance Approach. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 244-261
g5,g6,P,E

Giordan, A., Martinand, J.L. (1988). Etat des recherches sur les conceptions des apprenants a propos de la biologie (1). In: Giordan, A., Mathieu, J.L., Viovy, R.: Annales de didactique des sciences (no.2). Rouen: Universite de Rouen, 11-63
g1,g5,g6,B

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Gliner, G.S. (1981). A note on a statistical paradigm for the evaluation of cognitive structure in physics instruction. Applied Psychological Measurement 5, 493-502
g5

Goldberg, F.M. (1987). Investigating student understanding in physics with an interactive videodisc. Paper presented at the annual meeting of the American Educational Research Association. Washington D.C.
g5

Goldberg, F.M., McDermott, L.C. (1983). Not all the wrong answers students give represent misconceptions: Examples from interviews on geometrical optics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 335-345
g5

Gorodetsky, M., Gussarsky, E. (1986). Misconceptualization of the chemical equilibrium concept as revealed by different evaluation methods. European Journal of Science Education 8, 4, 427-441
g5,g6,C

Graf, D. (1989). Anwendung der Mapping-Methode zur Begriffsvermittlung und Begriffsüberprüfung am Beispiel einer Unterrichtseinheit "Ernährung und Verdauung" für die Klassen 5 und 6. Der mathematisch-naturwissenschaftliche Unterricht 42, 7, 427-432
g5,g6,B

Guesne, E., Sere, M.G., Tiberghien, A. (1983). Investigations on children's conceptions in physics: Which method for which result ? In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 420-424
g5

Gunstone, R.F., White, R.T. (1986). Assessing understanding by means of venn diagrams. Science Education 70, 2, 151-158
g5,g7

Gussarsky, E., Gorodetsky, M. (1988). On the chemical equilibrium concept: Constrained word associations and conceptions. Journal of Research in Science Teaching 25, 5, 319-333
g5,g6,C

Hagstedt, H., Spreckelsen, K. (1986). Wie Kinder physikalischen Phänomenen begegnen. Sachunterricht und Mathematik in der Primarstufe 14, 9, 318-323
g5,g6

Haney, R.E (1965). The development of a non-verbal test of children's concepts of animals. Journal of Research in Science Teaching 3, 3, 198-203
g5,g6,B

Happs, J.C., Stead, K. (1989). Using the repertory grid as a complementary probe in eliciting student understanding and attitudes towards science. Research in Science & Technological Education 7, 2, 207-220
g5,g6,CTL,OCI

Härtel, H. (1990). Lernen und Verstehen physikalischer Konzepte: Bericht über eine Untersuchung in den Jahren 1988-89. Kiel: IPN an der Universität Kiel
g5,g6,P,M,CSC,GEN

Hashweh, M.Z. (1988). Describtive studies of students' conceptions in science. Journal of Research in Science Teaching 25, 2, 121-134
g1,g5,g6,P,M

Head, J.O., Sutton, C. (1985). Language, understanding and commitment. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 91-100
g1,g5

Helm, H. (1985). Misconceptions' research: A problem oriented perspective. Paper prepared for the symposium "Perspectives on Cognitive Structure and Conceptual Change" at the annual meeting of the American Educational Research Association, Chicago
g1,g5

Hewson, P.W. (1983). Microcomputers and conceptual change: The use of a microcomputer program to diagnose and remediate an alternative conception of speed. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g5,g7,P,M

Hills, G.L.C. (1989). Students' "untutored" beliefs about natural phenomena: Primitive science or commonsense ? Science Education 73, 2, 155-186
g1,g4,g5

Hoffmann, K., Jung, W., Wiesner, H. (1975). Welche Informationen liefern Assoziationen von Schülern für den Physikunterricht ? In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 279-288
g5

Hoz, R. (1983). Enhancement and assessment of the reliability of instruments for the measuremnet of conceptual framework. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 153-162
g5

Hoz, R., Tomer, Y., Bowman, D., Chayoth, R. (1987). The use of concept mapping to diagnose misconceptions in biology and earth sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 245-256
g5,g6,B

Isa, A.M., Maskill,R. (1982). A comparison of science word meaning in the classrooms of two different countries: Scottish integrated science in Scotland and in Malaysia. British Journal of Educational Psychology 52, 188-198
g5

Jochems, W. (1986). Methodologische aspecten van protocolanalyse. Tijdschrift voor Didactiek der β-wetenschappen 4, 1, 1-18
g5

Johansson, B., Marton, F., Svensson, L. (1985). An approach to describing learning as change between qualitative different conceptions. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 233-266
g1,g5

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (1.Teil). physica didactica 5, 3, 125-146
g1,g5,g6,P,M,EN,OCI

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (2.Teil). physica didactica 5, 4, 231-248
g1,g5,g6,P,M,EN,OCI

Jung, W. (1981). Assoziationstests und verwandte Verfahren. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 196-222
g5

Jung, W. (1981). Some methods of inquiry into knowledge structures in mechanics. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 254-267
g5

Jung, W. (1983). Sprache und Physiklernen. Zur Beschreibung von Bewegung. Naturwissenschaften im Unterricht - Physik/Chemie 31, 10, 335-339
g5,g6,P,M

Jung, W. (1985). An example of the speaking - aloud technique in the domain of electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 185-195
g5,g6,P,E

Jung, W. (1985). Category questionnaire - the technique and some results. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 197-204
g5,g6,P,E

Jung, W. (1985). Die Methode des lauten Denkens. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 257-259
g5

Jung, W. (1987). Understanding students' understanding: the case of elementary optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 268-277
g5,g6,P,O

Jung, W. (1987). Verständnisse und Mißverständnisse. physica didactica 14, 1/2, 23-30
g1,g5,g6,P,O

Jung, W. (1989). Phänomenologisches vs physikalisches optisches Schema als Interpretationsinstrumente bei Interviews. physica didactica 16, 4, 35-46
g1,g5,g6,P,O

Jung, W. (n.d.). Versuche mit der Methode des "Lauten Denkens" bei physikalischen Problemen. Frankfurt/Main: Universität Frankfurt, Institut für Didaktik der Physik
g5,g6,P,O,E

Jungwirth, E. (1988). The associate field as a diagnostic instrument in assessing the breadth of multi-contextual concepts: the concept "development". International Journal of Science Education 10, 5, 571-579
g5,g6,g8,B

Kärrqvist, C. (1985). The development of concepts by means of dialogues centred on experiments. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 215-226
g5,g6,P,E

Kempa, R.F., Nicholls, C.E. (1983). Problem solving ability and cognitive structure - an exploratory investigation. European Journal of Science Education 5, 171-184
g5

Kesidou, S. (1990). Schülervorstellungen zur Irreversibilität. Kiel: Universität Kiel, Mathematisch-Naturwissenschaftliche Fakultät
g3,g5,g6,P,T,EN,IRR,OCI

Krajcik, J.S., Simmons, P.E., Lunetta, V.N. (1988). A research strategy for the dynamic study of students' concepts and problem solving strategies using science software. Journal of Research in Science Teaching 25, 2, 147-155
g5

Kubli, F. (1981). Piaget's clinical experiments and some conclusions for science teaching. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 92-105
g1,g5

Kubli, F. (1981). Piagets Methode des "kritischen Interviews" und ihre Bedeutung für die Reflexion des Physikunterrichts. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 223-240
g5

Kuhn, C., Aguirre, J. (1987). A case study an the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 262-274
g1,g5,g7

Larkin, J.H., Rainard, B. (1984). A research methodology for studying how people think. Journal of Research in Science Teaching 21, 235-254
g5

Lederman, N.G., O'Malley, M. (1990). Students' perceptions of tentativeness in science: development, use, and sources of change. Science Education 74, 2, 225-239
g5,g6,CSC,OCI

Lee, K.-W. (1988). Two non-traditional measures of chemistry learning: Word association and idea association. Research in Science Education 18, 169-176
g5

Licht, P. (1988). De ontwikkeling van een diagnostisch instrument voor de vaststelling van specifieke intuitieve ideeen over stroom en spanning. Tijdschrift voor Didactiek der β-wetenschappen 6, 2, 99-114
g5,g6,P,E

Linder, C.J. (1990). Is conceptual change something science teachers should be striving for ? Paper presented to the XVIII annual conference of the Canadian Society for the Study of Education, Victoria
g1,g5,g6,P,S

Linder, C.J., Erickson, G.L. (1989). A study of tertiary physics students' conceptualizations of sound. International Journal of Science Education 11, 491-501
g5,g6,P,S,AT

Lucas, A.M., McManus, P., Thomas, G. (1986). Investigating learning from informal sources: Listening to conversations and observing play in science museums. European Journal of Science Education 8, 4, 341-352
g5

Lybeck, L., Strömdahl, H., Tullberg, A. (1988). A research approach to science and mathematics education developed at Göteborg: Some methodological issues in studies of students' and educators' conceptions of certain strategically chosen concepts. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 38-108
g5,g6,P,M,C,OCI

Lythcott, J., Duschl, R. (1990). Qualitative research: From methods to conclusions. Science Education 74, 4, 445-460
g5

MacGuire, P.R., Johnstone, A.H. (1987). Techniques for investigating the understanding of concepts in science. International Journal of Science Education 9, 5, 656-577
g5

Maichle, U. (1986). Wissen und Verstehen im Physikunterricht: Diagnose auf kognitionspsychologischer Grundlage. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 53-65
g1,g5

Maloney, D.P. (1984). Rule-governed approaches to physics - Newton's third law. Physics Education 19, 37-42
g5,g6,P,M

Marton, F. (1981). Phenomenography - describing conceptions of the world around us. Instructional Science 10, 177-200
g1,g5

Maskill, R., Cachapuz, A.F.C. (1989). Learning about the chemistry topic of equilibrium: The use of word association tests to detect developing conceptualizations. International Journal of Science Education 11, 1, 57-69
g5,g6,C

Maskill, R., Pereira, D. (1980). Cognitive structure from diagraph analysis of language. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 349-358
g5

Masters, G.N. (1987). New views of student learning: implications for educational measurement. Melbourne: University of Melbourne, Centre for the Study of Higher Education
g1,g5

Matthews, G.P. (1989). Cognitive structure mapping as a tool in science teaching. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 351-365
g5

Matthews, G.P., Brook, V.G., Khan-Gandapur, T.H. (1984). Cognitive structure determinations as a tool in science teaching. Part 1: A new method of creating concept maps. European Journal of Science Education 6, 2, 169-177
g5

Matthews, G.P., Brook, V.G., Khan-Gandapur, T.H. (1984). Cognitive structure determination as a tool in science teaching. Part 2: The measurement of Piaget-specific levels. European Journal of Science Education 6, 289-297
g5

Matthews, G.P., Brook, V.G., Elliot, G.S., Kahn-Gandapur, T.H. (1985). Cognitive structure determination as a pool in science teaching. Part 3: Results. European Journal of Science Education 7, 263-279
g5,g6

Megarity, M.T. (1986). What does the student know ? Investigating a commonsense theory of motion. In: Lewis, R., Tagg, E.D.: Trends in computer assisted education. Oxford: Blackwell Scientific Publications, 232-234
g5,g6,P,M

Moreira, M.A. (1987). Concept mapping as a possible strategy to detect and to deal with misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 352-360
g5,g6,P,E

Moreira, M.A., Santos, C.A. (1981). The influence of content organization of student's cognitive structure in thermodynamics. Journal of Research in Science Teaching 18, 525-531
g5,g6,P,T

Münzinger, W. (1989). "Wenn Blei enstanden ist, dann ist es Reduktion von Bleioxid". chimica didactica 15, 5-25
g5,g6,C,GEN

Münzinger, W., Bergerhoff, F., Krumm, B. (1990). Mißverstehen und Verstehen bei Lehr-Lernprozessen im Chemieunterricht. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 187-189
g5

Nachmias, R., Stavy, R., Avrams, R. (1990). A microcomputer-based diagnostic system for identifying students' conception of heat and temperature. International Journal of Science Education 12, 2, 123-132
g5,g6,P,T

Nagy, M.H. (1948). The child's theories concerning death. The Journal of Genetic Psychology 73, 3-27
g5,g6,B,OCI,OIM

Nagy, P. (1983). Assessing cognitive structure: A response to Stewart. Science Education 67, 25-36
g5

Nagy, P. (Ed.) (1984). The representation of cognitive structures. Toronto: The Ontario Institue for Studies in Education
g5

Niedderer, H. (1989). Qualitative and quantitative methods of investigating alternative frameworks of students - With results from atomic physics and other subject areas. Paper presented to the annual meeting of the American Association of Physics Teachers. American Association for the Advancement of Science
g5,g6,P,Q,CSC

Novak, J.D. (1985). Metalearning and metaknowledge strategies to help students learn how to learn. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 189-209
g1,g5

Novak, J.D., Gowin, D.B. (1984). Learning how to learn. Cambridge: Cambridge Univerity Press
g1,g5,g7

Novak, J.D., Gowin, D.B., Johansen, G.T. (1983). The use of concept mapping and knowledge vee mapping with Junior High School science students. Science Education 67, 625-645
g5

Ogborn, J. (1980). Some uses of networks of options for describing complicated qualitative data. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 359-368
g5

Osborne, R., Freyberg, P. (1985). Children's science. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 1-14
g1,g5

Osborne, R., Gilbert, J.K. (1979). An approach to student understanding of basic concepts in science. Surrey: University of Surrey, Institute for Educational Technology
g5

Osborne, R., Gilbert, J.K. (1980). A method for investigating concept understanding in science. European Journal of Science Education 2, 3, 311-321
g5

Osborne, R., Gilbert, J.K. (1980). A technique for exploring students' views of the world. Physics Education 15, 6, 376-379
g5,GEN,OCI

Peterson, R.F., Treagust, D.F., Garnett, P.J. (1989). Development and application of a diagnostic instrument to evaluate grade-11 and grade-12 students' concepts of covalent bonding and structure following a course of instruction. Journal of Research in Science Teaching 26, 4, 301-314
g4,g5,g6,C

Pines, L. (1980). Protocols as indicators of cognitive structure: A cautionary note. Journal of Research in Science Teaching 17, 4, 361-362
g5

Pines, L., Novak, J.D. (1985). The interaction of audio-tutorial instruction with student prior knowledge: A proposed qualitative, case study methodology. Science Education 69, 213-228
g5

Pines, L., Novak, J.D., Posner, G.J., Vankirk, J. (1978). The clinical interview: A method for evaluating cognitive structure. Ithaca, N.Y.: Cornell University
g5

Pope, M., Denicolo, P. (1986). Intuitive theories - a researcher's dilemma: some practical methodological implications. British Educational Research Journal 12, 2, 153-166
g5

Pope, M., Gilbert, J. (1988). Students' conceptions: themes and variations. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 85-120
g1,g5

Pope, M., Watts, M., Gilbert, J. (1983). Constructive educational research. Paper presented at the 9th annual conference of the BERA, London
g1,g5

Posner, G.J., Gertzog, W.A. (1982). The clinical interview and the measurement of conceptual change. Science Education 66, 2, 195-209
g5

Preece, P.F.M. (1976). Associative structure of science concepts. British Journal of Educational Psychology 46, 174-183
g5

Preece, P.F.M. (1976). Science concepts in semantic space - a multidimensional scaling study. The Alberta Journal of Educational Research, 281-288
g5

Preece, P.F.W. (1976). Mapping cognitive structure: A comparison of methods. Journal of Educational Psychology 68, 1, 1-8
g5

Preece, P.F.W. (1978). Exploration of semantic space. Review of research on the organisation of scientific concepts in semantic memory. Science Education 62, 547-562
g1,g5

Proverbio, E., Lai, S. (1989). Spontaeous models and the formalization of the concepts of weather and time at the elementary school level. International Journal of Science Education 11, 1, 113-123
g5,g6,P

Ramsden, P., Masters, G.N., Bowden, J.A., Dall'Alba, G., Laurillard, D., Martin, E., Marton, F., Stephanou, A., Walsh, E. (1989). Speed, distance and time: A phenomenographic study of students' conceptions in kinematics. Paper presented at the Third European Conference for Research on Learning and Instruction, Madrid, Spain
g5,g6,P,M

Rennström, L. (1987). Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 400-414
g5,g6,P,C,AT

Ridgeway, D. (1988). Misconceptions and the qualitative method. The Science Teacher 55, 9, 68-71
g5,g6,P,M

Rogan, J.M. (1988). Conceptual mapping as a diagnostic aid. School Science and Mathematics 88, 1, 50-59
g5

Schuster, D.G. (1983). Research methodology in investigations of students' conceptions in science. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 234-238
g5

Schwedes, H. (1973). Die Bestimmung der emotionalen Bedeutung physikalischer Begriffe mit Hilfe des semantischen Differentials. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 72-85
g5

Seddon, G.M., Pedrosa, M.A. (1988). A comparsion of students' explanations derived from spoken and written methods of questioning and answering. International Journal of Science Education 10, 3, 337-342
g5

Shapiro, B.L. (1989). What children bring to light: Giving high status to learners' views and actions in science. Science Education 73, 6, 711-733
g5,g6,P,O,CSC,CTL,OCI

Shavelson, R.J. (1974). Methods for examining representations of a subject-matter structure in a students' memory. Journal of Research in Science Teaching 11, 231-249
g5

Shavelson, R.J. (1985). The measurement of cognitive structure. Paper presented in the Symposium on the "Psychology of Learning" at the annual meeting of the American Educational Research Association, Chicago
g5

Shuell, T.J. (1985). Knowledge representation, cognitive structure and school learning: A historical perspective. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 117-130
g1,g5

Snively, G. (1987). The metaphor interview and the analyses of conceptual change. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 434-447
g5,g6

Spreckelsen, K. (1985). Zur Ermittlung von Schülervorstellungen im Grundschulalter. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 236-238
g5

Spreckelsen, K. (1987). Zur Analyse von Schüleräußerungen über einfache physikalische Phänomene. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchtturm, 164-166
g5

Stewart, J. (1979). Content and cognitive structure: Critique of assessment and representation techniques used by science education researches. Science Education 63, 3, 395-405
g5

Stewart, J. (1980). Techniques for assessing and representing information in cognitive structure. Science Education 64, 2, 223-235
g5

Stuart, H.A. (1985). Should concept maps be scored numerically ? European Journal of Science Education 7, 73-81
g5

Sumfleth, E. (1987). Verfahren zur Untersuchung kognitiver Strukturen. chimica didactica 13, 161-193
g5

Sumfleth, E. (1988). Lehr- und Lernprozesse im Chemieunterricht. Frankfurt: Lang
g1,g5,g6,C

Sutton, C. (1980). The learner's prior knowledge: A critical review of techniques for probing its organisation. European Journal of Science Education 2, 107-120
g5

Tamir, P. (1989). Some issues related to the use of justifications to multiple-choice answers. Journal of Biological Education 23, 4, 285-292
g5,g6,B

Tamir, P. (n.d.). Some issues related to the use of justifications to multiple choice answers. Paper of the School of Education and Israel Science Teaching Center, Hebrew University, Jerusalem
g5,g6,B

Tasker, R., Osborne, R. (1983). Portraying pupils' classroom experiences. Research in Science and Technological Education 1, 2, 133-144
g5

Theman, J. (1979). The interview as a research instrument. Paper presented at the NFPF annual conference , October, Lillehammer, Norway. Reports from the Institute of Education, University of Göteborg
g5

Tobias, S.D. (1987). In class methods for getting at student misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 514-516
g5

Touger, J.S. (1983). Analyzing the linguistic structure of physical concepts: Possible implications for educational research and for physics pedagogy. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 403-410
g4,g5

Treagust, D.F. (1985). Diagnostic tests to evaluate student's misconceptions in science . Paper presented at the 58th Annual Meeting of the National Association for Research in Science Teaching, French Lick Spring, Indiana
g5

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Treagust, D.F. (1988). Development and use of diagnostic tests to evaluate students' misconceptions in science. International Journal of Science Education 10, 2, 159-169
g5,g6,B,C

Treagust, D.F. (1989). The development and use of diagnostic instruments to evaluate students' misconceptions in science. Paper prepared for the annual meeting of the American Education Research Association, San Francisco
g5

Trowbridge, J.E., Mintzes, J.J. (1985). Students' alternative conceptions of animals and animal classification. School Science and Mathematics 85, 304-316
g5,B

Viennot, L. (1985). Analysing students' reasoning in science: A pragmatic view of theoretical problems. European Journal of Science Education 7, 2, 151-162
g1,g5,g6,P,M

Voorde, H.H. ten (1980). Education based on a new concept of teaching in chemistry. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 310-319
g5,g7,C

Wachsmuth, J. (1985). Logical analysis of cognitive organizational structures. Paper presented at the annual meeting of the American Educational Research Association, Chicago
g5

Wallace, J.D., Mintzes, J.J. (1990). The use of concept maps in examining students' conceptions and structure of knowledge in science. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Atlanta
g5

Wandersee, J.H. (1987). Drawing concept circles: a way of revealing what the learner knows. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 506-520
g5

Watts, M. (1980). Suggestions for generating and designing cards for the interview about instances approach. Working paper presented by the Institute for Educational Technology, University of Surrey
g5

Watts, M. (1981). Exploring pupils' alternative frameworks using the Interview-About-Instances Method. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 365-386
g5

West, L. (1980). Towards descriptions of the cognitive structures of science students. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 342-348
g1,g5

West, L. (1985). Concept mapping. Paper prepared for the symposium "Perspectives on Cognitive Structure and Conceptual Change" at the annual meeting of the American Educational Research Association, Chicago
g5,g7

West, L., Fensham, P.J., Garrard, J.E. (1985). Describing the cognitive structures of learners following instruction in chemistry. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 29-49
g1,g5

White, R.T. (1985). Interview protocolls and dimensions of cognitive structure. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 51-59
g5

Whitelock, D. (1988). Repertory grid elicitation: A potential tool for studying secondary school pupils' ideas in dynamics ? In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 233-244
g5,g6,P,M

Young, D.B., Tamir, P. (1977). Finding out what students know. The Science Teacher 43, 9, 27-28
g5

Zietz, K. (1937). Physikalische Theorien bei Kindern. Bericht über den XV. Kongreß der Deutschen Gesellschaft für Psychologie, Jena, 232-238
g5,g6,g8,ORC

Zimmermann, M.L., Bain, D. (1988). Que vaut notre evaluation des connaissances ? Les avatars d'un questionnaire de physique. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique. , 503-508
g5

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	**Area of physics**
E - Elektrizität	**- electricity**

Aalst, H.V. (1985). The differentation between connections in series and in parallel from cognitive mapping. Implications for teaching. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 115-128
g6,g7,P,E

Ameh, C.O. (1987). Misconceptions in science amongst nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the quaility of life. Kiel: IPN-Materialien, 321-330
g6,g8,P,E,M

Ameh, C.O., Gunstone, R.F. (1985). Teachers' concepts in science. Research in Science Education 15, 151-157
g6,g8,P,M,E,B

Ameh, C.O., Gunstone, R.F. (1986). Science teachers' concepts in Nigeria and Australia. Research in Science Education 16, 73-81
g6,g8,P,E,M,B

Andersson, B.R. (1980). Pupils' understanding of some aspects of energy transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6,P,M,E,T

Andersson, B.R. (1984). Wie Schüler einige Aspekte des Energietransfers im elektrischen Stromkreis verstehen. Der Physikunterricht 2, 32-35
g6,P,E

Andersson, B.R. (1985). Pupils' reasoning with regard to an electromagnet. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 153-163
g6,P,E

Andersson, B.R. (1986). The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 155-171
g1,g6,P,M,E,T,O

Aufschnaiter, S. von, Duit, R., Fillbrand, H., Niedderer, H. (1970). Der einfache elektrische Stromkreis im 5. und 6. Schuljahr. Naturwissenschaften im Unterricht - Physik/Chemie 18, 135-143, 182-188
g6,P,E

Bauman, R.P., Adams, S. (1990). Misunderstandings of electric current. The Physics Teacher 28, 5, 334
g6,P,E

Benyamna, S. (1987). La pregnance du modele particulaire dans les representations d'etudiants en science, a l'egard de phenomenes naturels. Quebec: Universite Laval
g6,P,AT,O,E

Black, D., Solomon, J. (1987). Can pupils use taught analogies for electric current ? School Science Review, 249-254
g6,P,E

Brauner, R., Peters, A. (1976). Auffassungen, Vorstellungen und Begriffe von Kindern im Zusammenhang mit der Elektrizität und dem elektrischen Strom. Naturwissenschaften im Unterricht - Physik/Chemie 24, 185-187, 240-244, 323-327
g6,P,E

Buchweitz, B., Moreira, M.A. (1987). Misconceptions in physics: Research findings among Brazilian students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 54-59
g6,P,E

Butts, W. (1985). Children's understanding of electric current in three countries. Research in Science Education 15, 127-130
g6,P,E

Caillot, M. (1983). Science cognitive et didactique des sciences experimentales. Communication presentee aux 5emes Journees sur l'Enseignement Scientifique, Chamonix
g6,P,E

Caillot, M. (1985). Problem representations and problem-solving procedures in electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 139-151
g6,P,E

Caillot, M., Chalouhi, E. (1984). Problemlösen im Bereich der Elektrizitätslehre. Der Physikunterricht 2, 36-45
g6,P,E

Chalouhi, E. (1981). Mecanismes cognitifs utilise' par les eleves et leurs professeurs dans la resolution d'un probleme d'electrocinetique. Role de la conection du probleme, en classe, par les professeurs. Paris: Universite Paris VII, Laboratoire Interuniversitaire de Recherche sur l'Enseignement des Science Physiques et de la Technologie
g1,g6,P,E

Closset, J.L. (1983). Sequential reasoning in electricity. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 313-319
g6,P,E

Closset, J.L. (1984). Woher stammen bestimmte "Fehler" von Schülern und Studenten aus dem Bereich der Elektrizitätslehre ? Kann man sie beheben ? Der Physikunterricht, 21-31
g6,P,E

Cohen, R. (1985). Causual relations in electric circuits: students' concepts. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 107-113
g6,g7,P,E

Cohen, R., Eylon, B., Ganiel, M. (1983). Potential difference and current in simple electric circuits: A study of students' concepts. American Journal of Physics 51, 407-412
g6,P,E

Cosgrove, M., Osborne, R., Carr, M. (1985). Children's intuitive ideas on electric circuit and the modifikation of those ideas. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 247-256
g6,g7,P,E

Danusso, L., Dupre, F. (1987). Student representations of simple electric circuits. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 111-115
g6,P,E

Di Sessa, A.A. (1983). Phenomenology and the evolution of intuition. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 15-33
g1,g6,P,E,M

Duit, R. (1983). Strom - ein Wort der Alltagssprache und der Fachsprache. Naturwissenschaften im Unterricht - Physik/Chemie 31, 10, 344-347
g4,g6,P,E

Duit, R. (1985). Students' representations of the topological structure of the simple electric circuit. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 83-93
g5,g6,P,E

Duit, R. (1985). The meaning of current and voltage in everyday language and its consequences for understanding the physical concepts of the electric circuit. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 205-214
g4,g5,g6,P,E

Duit, R. (1986). Übersicht über Schülervorstellungen im Bereich der elementaren Elektrizitätslehre. Teil I: Zur Rolle der Alltagssprache und zu Vorstellungen von der topologischen Struktur elektrischer Stromkreise. Kiel: IPN
g6,P,E

Duit, R., Jung, W., Rhöneck, C. von (1985). Understanding and teaching electricity - a guide to the workshop's papers. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 9-38
g5,g6,g7,P,E

Duit, R., Jung, W., Rhöneck, C. von (Eds.) (1985). Aspects of understanding electricity. Proceedings of an international workshop in Ludwigsburg 1984. Kiel: Schmidt & Klaunig
g6,g7,P,E

Dupin, J.J., Johsua, S. (1987). Conceptions of French pupils concerning electric circuits: structure and evolution. Journal of Research in Science Teaching 24, 9, 791-806
g6,P,E

Erle, G. (1968). Untersuchung von Lernvorgängen im Physikunterricht. Zeitschrift für Naturlehre und Naturkunde 16, 34-41
g6,P,E

Eylon, B.-S., Ganiel, U. (1990). Macro-micro relationship: the missing link between electrostatics and electrodynamics in students' reasoning. International Journal of Science Education 12, 1, 79-94
g6,P,E,OCI

Faucher, G. (1983). Advanced physics cources do not provide students with conceptual change. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 322-325
g6,P,E,M,MAG

Feher, E. (1983). Identification of certain preconceptions that hinder science learning: Examples involving electric circuits. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 328-334
g6,P,E

Ferguson-Hessler, M., De Jong, T. (1983). On success and failure in the solving of problems in electricity and magnetism. Summer Workshop: Research on Physics Education. La Londe Les Maures
g6,P,E

Fischer, H.E. (1988). Die Rekonstruktion von Denkprozessen - Fallstudien im Physikunterricht zur Elektrostatik und zur elektrischen Spannung. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen. Gießen: DPG Fachausschuß Didaktik der Physik, 513-517
g5,g6,P,E

Fischer, H.E. (1988). Die Rekonstruktion von Denkprozessen. Fallstudien im Physikunterricht zur Elektrostatik und zur elektrischen Spannung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung 1987 in Nürnberg. Alsbach: Leuchtturm-Verlag, 316-319
g5,g6,P,E

Fischer, H.E. (1989). Lernprozesse im Physikunterricht. Bremen: Universität Bremen
g1,g5,g6,g7,P,E,OCI

Fischer, H.E. (1990). Darstellung, Ergebnisse und Schlußfolgerungen einer Lernprozeßanalyse im Physikunterricht zur Elektrostatik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 235-237
g6,P,E

Fredette, N., Clement, J. (1979). Textbook problems and the real world: Students' conceptions of a problem relating to an electrical circuit. Amherst: University of Massachusetts, Department of Physics and Astronomy
g6,P,E

Fredette, N., Lochhead, N. (1980). Student conceptions of simple circuits. The Physics Teacher 18, 3, 194-198
g6,P,E

Fredette, N.H., Clement, J. (1981). Student misconceptions of an electric circuit: What do they mean ? Journal of College Science Teaching 10, 5, 280-285
g6,P,E

Ganiel, U., Eylon, B.S. (1987). Electrostatics and electrodynamics - the missing link in students' conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics". Vol.III. Ithaca: Cornell University, 168-179
g6,P,E

Garnett, P.J., Treagust, D.F. (1989). Difficulties experienced by senior high school chemistry students of electrochemistry: Electric circuits and oxidation-reduction equations. Paper presented at the annual meeting of the National Association for Research in Science Teaching
g6,P,E,C,OCI

Gauld, C.F. (1986). Models, meters and memory. Research in Science Education 16, 49-54
g6,P,E

Gauld, C.F. (1988). The cognitive context of pupils' alternative frameworks. International Journal of Science Education 10, 3, 267-274
g6,P,E,g7

Gentner, D., Gentner, D.R. (1983). Flowing waters or teeming crowds: Mental models of electricity. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 99-129
g6,P,E

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Gilbert, J.R., Osborne, R. (1980). Identifying science students' concepts: The Interview-About-Instance Approach. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 244-261
g5,g6,P,E

Gott, R. (1985). Predicting and explaining the operation of simple DC circuits. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 63-72
g6,P,E

Gott, R. (1985). The place of electricity in the assessment of performance in science. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 49-61
g6,P,E

Gott, R. (n.d.). Electricity at age 15: APU science. Topic Report 7. Leeds: Assessment of Performance Unit
g6,P,E

Grob, K., Rhöneck, C. von, Pollak, V. (1990). Analyse von Informationsverarbeitungsprozessen in der Elektrizitätslehre mit Hilfe eines Expertensystems. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 254-256
g6,P,E

Hamida, J.B. (1980). Modeles de fonctionnement de circuits electriques simples chez des enfants de 12 ans. Paris: Universite Paris VII
g6,P,E

Hauke, B. (1981). Ein an Schülervorstellungen orientierter Einstieg in die Elektrostatik. Naturwissenschaften im Unterricht - Physik/Chemie 29, 3, 103-109
g6,g7,P,E

Heege, R., Schwaneberg, R. (1985). Zur Anschaulichkeit elektrischer und magnetischer Felder. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1985. München: DPG Fachausschuß Didaktik der Physik, 275-282
g6,P,E,FLD,MAG

Heller, P. (1987). Use of core propositions in solving current electricity problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 225-235
g6,g8,P,E

Hilscher, H., Eigenstetter-Bösl, E. (1989). Fehlvorstellungen können jeden Physikunterricht überdauern. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 281-297
g6,P,M,T,E

Holla, E. (1963). Deutung eines technischen Vorgangs durch Knaben einer 8. Volksschulklasse. Schule und Psychologie 10, 321-331
g6,P,E

Johsua, S. (1983). La "metaphore du fluide" et le "raisonnement en courant". Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 321-330
g6,P,E

Johsua, S., Dupin, J.J. (1985). Schematic diagrams, representations and type of reasoning in basic electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 129-138
g6,P,E

Johsua,S. (1984). Students' interpretation of simple electrical diagrams. European Journal of Science Education 6, 271-275
g6,P,E

Jordan, J., Ebinghaus, H., Janetzki, V. (1977). Der Energietransport bei elektromagnetischen Vorgängen. Vorstellungen von Schülern und Studenten. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 159-162
g6,P,E

Jung, W. (1985). An example of the speaking - aloud technique in the domain of electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 185-195
g5,g6,P,E

Jung, W. (1985). Category questionnaire - the technique and some results. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 197-204
g5,g6,P,E

Jung, W. (n.d.). Erhebung zur Elektrizitätslehre (Kontrolluntersuchung). Frankfurt/Main: Universität Frankfurt, Institut für Didaktik der Physik
g6,P,E

Jung, W. (n.d.). Versuche mit der Methode des "Lauten Denkens" bei physikalischen Problemen. Frankfurt/Main: Universität Frankfurt, Institut für Didaktik der Physik
g5,g6,P,O,E

Jung, W., Voss, H.P. (1986). Zum Verständnis der elementaren Elektrizitätslehre. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1986 in Gießen. Gießen: DPG-Fachausschuß Didaktik der Physik, 257-263
g6,P,E

Jung, W., Wiesner, H., Kiowski, I., Weber, E. (1982). Zum Anfangsunterricht in der Elektrizitätslehre. physica didactica 9, 257-272
g6,g7,P,E

Kärrquist, C. (1987). Pupils are able. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 293-296
g6,P,E

Kärrqvist, C. (1985). Kunskapsutveckling genom experiment-centrerade dialoger i ellära. Göteborg Studies in Educational Sciences 52. Acta Universitatis Gothenburgensis. Göteborg
g6,P,E

Kärrqvist, C. (1985). The development of concepts by means of dialogues centred on experiments. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 215-226
g5,g6,P,E

Kircher, E. (1987). Empirische Untersuchungen zum Spannungsbegriff in der S I. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchttturm, 242-244
g6,P,E

Kircher, E., Busch, T.V. (1984). Empirische Untersuchungen am elektrischen Stromkreis bei lernbehinderten Schülern. Würzburg: Universität Würzburg
g6,P,E

Licht, P. (1985). Concept development in electricity: A strategy and some provisional results. Paper prepared for the International Symposium on Physics Teaching. Universite Libre de Bruxelles
g6,g7,P,E

Licht, P. (1988). De ontwikkeling van een diagnostisch instrument voor de vaststelling van specifieke intuitieve ideeen over stroom en spanning. Tijdschrift voor Didactiek der β-wetenschappen 6, 2, 99-114

g5,g6,P,E

Lovell, K. (n.d.). Understanding of scientific concepts at different developmental levels and a technique for investigating the degree of understanding. Illustrated by reference to electrostatic and gravitational. Potential

g6,P,E,M

Maichle, U. (1979). Schemata als Organisationsprinzipien beim Erwerb physikalischer Inhalte aus dem Bereich der Elektrizitätslehre. Naturwissenschaften im Unterricht - Physik/Chemie 27, 33-39

g6,P,E

Maichle, U. (1981). Representation of knowledge in basic electricity and its use for problem solving. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 174-193

g6,P,E

Maichle, U. (1985). Wissen, Verstehen und Problemlösen im Bereich der Physik. Frankfurt/Main: Lang

g1,g6,P,E

McDermott, L.C., Zee, E. van (1985). Identifying and adressing student difficulties with electric circuits. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 39-48

g6,g7,P,E

McIntyre, P.J. (1974). Student's use of model in their explanations of electrostatic phenomena. Science Education 58, 4, 577-580

g6,P,E

Menge, S., Schwedes, H. (1988). Transferprozesse von Wasserstromkreisen auf elektrische Stromkreise bei einzelnen Schülern. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 311-313

G6,G7,P,E

Menge, S., Schwedes, H. (1989). Untersuchung von Lern- und Transferprozessen im Physikunterricht zur Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 237-239

g6,g7,P,E

Menge, S., Schwedes, H., Dudeck, W.-G. (1990). Fallbeispiele von Schülern in der Auseinandersetzung mit Alltagsvorstellungen im Unterricht zur Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 244-246

g6,P,E

Moreira, M.A. (1987). Concept mapping as a possible strategy to detect and to deal with misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 352-360

g5,g6,P,E

Niedderer, H. (1973). Sachstruktur und Schülerfähigkeiten beim einfachen elektrischen Stromkreis. IPN-Arbeitsberichte 2

g6,P,E

Oldham, V., Black, P., Solomon, J., Stuart, H. (1986). A study of pupil views on the dangers of electricity. European Journal of Science Education 19, 2, 13

g6,P,E

Osborne, R. (1983). Towards modifying children's ideas about electric current. Research in Science and Technological Education 1, 1, 73-82
g6,g7,P,E,OCI

Osborne, R.J. (1981). Children's ideas about electric current. New Zealand Science Teacher, 29, 12 ff
g6,P,E

Osborne, R.J. (1981). Children's views on electric circuit. New Zealand Science Teacher, 27, 12 ff
g6,P,E

Peters, P.C. (1982). Even honors students have conceptual difficulties with physics. American Journal of Physics 50, 501-508
g6,P,E,M,OCI

Preece, P.F.W. (1976). The concepts of electromagnetism: A study of the internal representation of external structures. Journal of Research in Science Teaching 13, 6, 517-524
g6,P,E

Prüm, R. (1985). How do 12 year olds approach simple electric circuits ? In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 227-234
g6,P,E

Psillos, D., Koumaras, P., Tiberghien, A. (1988). Voltage presented as a primary concept in an introductory teaching sequence on DC circuits. International Journal of Science Education 10, 1, 29-43
g6,g7,P,E

Psillos, D., Koumaras, P., Vallastades, O. (1985). Teaching DC circuits in order to affect conceptual change to gymnasium pupils. Proceedings of an international symposium on physics teaching, Brussels
g6,P,E

Rhöneck, C. von (1980). Schüleräußerungen zum Begriff der elektrischen Spannung beim Erklären realer Experimente. Der Physikunterricht 14, 4, 16-29
g6,P,E

Rhöneck, C. von (1981). Students' conceptions of the electric circuit before physics instruction. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 194-213
g6,P,E

Rhöneck, C. von (1983). Semantic structures describing the electric circuit before and after instruction. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 303-312
g6,P,E

Rhöneck, C. von (1984). Semantische Strukturen in den Schülervorstellungen vom Stromkreis. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1984 in Münster. Gießen: DPG-Fachausschuß Didaktik der Physik, 206-208
g6,P,E

Rhöneck, C. von (1985). Forschungsschwerpunkt Schülervorstellungen - Methoden und Ergebnisse im Bereich der Elektrizitätslehre. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 71-82
g6,P,E

Rhöneck, C. von (1985). The introduction of voltage as an independent variable - the importance of preconceptions, cognitive conflict and operating rules. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 275-286
g6,P,E

Rhöneck, C. von (1986). Problemlösen und Schülervorstellungen im Bereich der einfachen Elektrizitätslehre. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1986 in Gießen. Gießen: DPG-Fachausschuß Didaktik der Physik, 264-275
g6,P,E

Rhöneck, C. von (1986). Schülervorstellungen im Bereich der Elektrizitätslehre als kognitive Strukturen. Kiel: IPN
g6,P,E,OIM

Rhöneck, C. von (1986). Vorstellungen vom elektrischen Stromkreis. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 10-14
g6,P,E

Rhöneck, C. von, Grob, K. (1987). Representation and problem-solving in basic electricity-predictors for successful learning. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 564-577
g6,P,E

Rhöneck, C. von, Grob, K. (1988). Aspekte des Lernens in der Elektrizitätslehre und die sie bestimmenden Faktoren. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie 1987 in Nürnberg. Alsbach: Leuchtturm, 322-327
G6,P,E

Rhöneck, C. von, Grob, K. (1988). Der Zusammenhang zwischen Leistungswerten und psychologischen Variablen. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen . Gießen: DPG Fachausschuß Didaktik der Physik, 212-223
g1,g6,P,E

Rhöneck, C. von, Grob, K. (1988). Lernergebnisse in der Elektrizitätslehre und ihr Zusammenhang mit psychologischen Variablen. physica didactica 15, 1, 9-19
g6,P,E

Rhöneck, C. von, Grob, K. (1988). Psychological aspects of learning about basic electricity. Polykop. Pädagogische Hochschule Ludwigsburg
g6,P,E

Rhöneck, C. von, Grob, K. (1988). Psychological aspects of learning about basic electricity. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 166-181
g1,g6,P,E

Rhöneck, C. von, Grob, K. (1989). Psychologische Aspekte des Lernens in der einfachen Elektrizitätslehre. physica didactica 16, 1, 41-54
g1,g6,P,E

Rhöneck, C. von, Völker, B. (1984). Vorstellungen vom Stromkreis und ihr Einfluß auf den Lernprozeß. Der Physikunterricht 2, 4-16
g6,P,E

Rhöneck, C. von, Völker, B. (1985). Semantic structures describing the electric circuit - before and after instruction. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 95-106
g6,P,E

Rhöneck, C. von. (1986). Problemlösen und Schülervorstellungen im Bereich der einfachen Elektrizitätslehre. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 215-217
g6,P,E

Riley, M.S. (1985). Structural understanding and problem-solving skill. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 165-176
g6,P,E

Schmidt, D. (1989). Zum Konzeptwechsel: Eine Untersuchung über den Konzeptwechsel am elektrischen Stromkreis. Frankfurt/Main: Peter Lang
g1,g6,g7,P,E,OCI

Schmidt-Wolbrandt, K. (1990). Alltagsvorstellungen, Wissen und Einstellung von Schülern im Zusammenhang mit der Gefährdung durch Elektrizität. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 226-228
g6,P,E

Schulte, W. (1982). Die Wirksamkeit von Physikunterricht beim Erlernen physikalischer Termini. Naturwissenschaften im Unterricht - Physik/Chemie 30, 3, 97-100
g6,P,E

Schwedes, H. (1983). Zur Kontinuitätsvorstellung bei Wasserstromkreisen und elektrischen Schaltungen. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: I. Physikalisches Institut, 264-269
g6,g7,P,E,OCI

Schwedes, H. (1984). The importance of watercircuits in teaching electric circuits. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity electricity. Proceedings of a workshop. Ludwigsburg: Pädagogische Hochschule, 11
g6,P,E

Schwedes, H., Schilling, P. (1983). Schülervorstellungen zu Wasserstromkreisen. physica didactica 10, 159-170
g6,P,E

Shipstone, D.M. (1984). A study of children's understanding of electricity in simple DC circuits. European Journal of Science Education 6, 185-188
g6,P,E,GEN,OCI

Shipstone, D.M. (1985). Electricity in simple circuits. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 33-51
g6,g7,P,E

Shipstone, D.M. (1985). On children's use of conceptual models in reasoning about current electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 73-82
g6,P,E

Shipstone, D.M. (1988). Pupils' understanding of simple electrical circuits - Some implications for instruction. Physics Education 23, 92-96
g6,g7,P,E

Shipstone, D.M. (n.d.). A study of secondary school pupils' understanding of current, voltage and resistance in simple DC circuits. Nottingham: University of Nottingham, School of Education
g6,P,E,GEN,OCI

Shipstone, D.M., Rhöneck, C. von, Jung, W., Kärrquist, C., Dupin, J.J., Joshua, S., Licht, P. (1988). A study of students' understanding of electricity in five European countries. International Journal of Science Education 10, 3, 303-316
g6,P,E

Solomon, J., Black, P., Oldham, V., Stuart, H. (1985). The pupils' view of electricity. European Journal of Science Education 7, 281-294
g6,P,E

Springfeld, U. (1987). Schülerinterpretation eines klassischen Experiments zur Elektrostatik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchttturm, 248-250
g6,P,E

Springfeld, U. (1988). Schüler in Auseinandersetzung mit dem Ladungsbegriff. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie 1987 in Nürnberg. Alsbach: Leuchtturm, 319-321
G6,P,E

Springfeld, U. (1990). Schüler auf dem Wege zum Ladungsbegriff II. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 238-240
g6,P,E

Steinberg, M.S. (1983). Reinventing electricity. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 388-401
g6,P,E

Stork, E., Wiesner, H. (1981). Schülervorstellungen zur Elektrizitätslehre und Sachunterricht. Bericht über einen Versuch zur Integration von fachdidaktischer Forschung und schulpraktischer Ausbildung an der Universität. Sachunterricht und Mathematik in der Primarstufe 9, 218-230
g6,g7,P,E,OCI

Strack, D. (1987). Ein Unterrichtsversuch in einer Elektroinstallateurklasse zur Berücksichtigung von Schülervorstellungen in der Elektrotechnik am Beispiel der Berührungsspannung. Hausarbeit im Rahmen der Zweiten Staatsprüfung für das Lehramt an der Oberstufe - Berufliche Schulen - im Berufsfach Elektrotechnik, 1-31
g6,g7,P,E

Tasker, R., Osborne, R. (1985). Science teaching and science learning. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 15-27
g6,g7,P,E

Tenney, Y., Gentner, D. (1985). What makes analogies accessible: Experiments on the water - flow analogy for electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 311-318
g6,P,E

Thorley, N.R., Treagust, D.F. (1987). Conflict within dyadic interactions as a stimulant for conceptual change in physics. International Journal of Science Education 9, 2, 203-216
g6,g7,P,M,E

Tiberghien, A. (1983). Critical review on the research aimed at elucidating the sense that the notions of electric circuits have for students aged 8 to 20 years. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 109-123
g6,P,E,OCI

Tiberghien, A., Delacote, G. (1976). Manipulation et representations de circuits electrique simples chez des enfants de 7 a 12 ans. Review Francaise de Pedagogie 34, 32-44
g6,P,E,OIM,GEN,OCI

Tolle-Herlyn, A. (1986). Der mühsame Weg bis zur Ausbildung einer einfachen Stromkreisvorstellung. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 218-222
g6,P,E,OCI

Voss, H.P. (1990). Das Problem der Sprache in der Didaktik der Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 248-250
g4,g6,P,E

Wilkinson, D. (1973). A study of some concepts involving electricity. Leeds: University of Leeds
g6,P,E

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P	**- Bereich der Physik**	**Area of physics**
T	**- Wärme**	**- heat**

Ackermann, K., Dinter, K., Jaeckel, K. (1986). Untersuchungen von Schülervorstellungen und Handlungsweisen im Bereich Wärmelehre. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 203-205
g6,P,T

Albert, E. (1978). Development of the concept of heat in children. Science Education 63, 3, 389-399
g6,P,T

Andersson, B.R. (1980). Pupils' understanding of some aspects of energy transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6,P,M,E,T

Andersson, B.R. (1980). Some aspects of children's understanding of boiling point. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 252-259
g6,P,T

Andersson, B.R. (1986). The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 155-171
g1,g6,P,M,E,T,O

Appleton, K. (1985). Children's ideas about temperature. Research in Science Education 15, 122-126
g6,P,T

Bach, S. (1987). Syntax-abhängige Auffassungsweisen physikalischer Vorgänge am Beispiel des Leidenfrostschen Phänomens. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1987 in Berlin. Gießen: DPG Fachausschuß Didaktik der Physik, 258-263
g4,g6,P,T

Bach, S. (1988). Schülerprognosen über Mischungstemperaturen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 287-289
G6,P,T,GEN

Bar, V. (1987). The effect of the testing format on the distribution of the results. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 26-31
g5,g6,P,T

Beveridge, M. (1985). The development of young childrens' understanding of the process of evaporation. Britisch Journal of Educational Psychology 55, 84-90
g6,P,T

Brand, K.-J., Brauner, R. (1978). Auffassungen, Vorstellungen und Begriffe von Kindern im Zusammenhang mit Phänomenen der Wärmelehre. Naturwissenschaften im Unterricht - Physik/Chemie 26, 105-116
g6,P,T

Brook, A., Briggs, H., Bell, B., Driver, R. (1984). Aspects of secondary students' understanding of heat: Summary report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,P,T

Brook, A., Briggs, H., Bell, B., Driver, R. (1984). Aspects of secondary students' understanding of heat: Full report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,P,T

Cachapuz, A.F.C., Maskill, R. (1987). Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. International Journal of Science Education 9, 4, 491-504
g5,g6,g7,C,P,T

Duit, R. (1986). Wärmevorstellungen. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 30-33
g6,P,T

Duit, R., Kesidou, S. (1988). Students' understanding of basic ideas of the second law of thermodynamics. Research in Science Education 18, 186-195
g6,P,T,IRR

Engel Clough, E., Driver, R. (1985). Secondary students' conceptions bringing together scientific and personal views. Physics Education 20, 175-182
g6,g7,P,T

Engel Clough, E., Driver, R. (1986). A study of consistency in the use of students' conceptual frameworks across different task contexts. Science Education 70, 4, 24
g6,P,M,T,B

Engel Clough, E., Driver, R. (1987). How do children's scientific ideas change over time? School Science Review, 255-267
g6,P,B,T,M

Engelhardt, P., Jung, W., Wiesner, H. (1975). Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 249-258
g5,g6,P,M,T

Erätuuli, M. (1984). Wie können sich die finnischen Schüler der Schuljahre 7 bis 9 die alltäglichen Phänomene der Wärmelehre erklären ? Helsinki: University of Helsinki, Department of Teacher Education
g6,P,T

Erätuuli, M. (1987). Welche Vorstellungen haben finnische Schüler von den alltäglichen Phänomenen der Wärmelehre. Helsinki: University of Helsinki/Department of Teacher Education
g6,P,T

Erickson, G.L. (1979). Children's conceptions of heat and temperature. Science Education 63, 2, 221-230
g6,P,T

Erickson, G.L. (1980). Children's viewpoints of heat: A second look. Science Education 64, 323-336
g6,P,T

Erickson, G.L., Tiberghien, A. (1985). Heat and temperature. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,T

Fedra, D. (1989). Schülervorstellungen zum Energieverbrauch und ihre Aufarbeitung im Physikunterricht der Sekundarstufe II. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 298-306
g6,P,T,EN,OCI

Fedra, D. (n.d.). Styropor ist warm und Eisen ist kalt - Sinnestäuschung oder physikalische Realität ? Polykop. Gesamthochschule Kassel
g2,g6,P,T

Finley, F.N. (1985). Variations in prior knowledge. Science Education 69, 697-705
g6,P,T

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Granville, M.F. (1985). Student misconceptions in thermodynamics. Journal of Chemical Education 62, 10, 847-848
g6,P,T,EN,ENT

Grimellini Tomasini, N., Pecori Balanda, B. (1987). Teaching strategies and children's science: an experiment on teaching about hot and cold. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 158-171
g6,g7,P,T

Guesne, E., McDermott, L.C. (1983). Students' conceptions and learning in the fields of light and heat. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 577-579
g6,P,T,O

Guesne, E., Tiberghien, A., Delacote, G. (1978). Methods et resultats concernant l'analyse des conceptions des eleves dans differents domaines de la physique. Deux exemples: les notions de chaleur et lumiere. Revue Francaise de Pedagogie 45, 25-36
g6,P,T,O

Hagemeister, V. (1989). Erfahrungen mit Bimetallen. In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 57-65
g6,P,T

Hall, G.S., Browne, C.E. (1903). Children's ideas of fire, heat, frost and cold. Pedagogic Seminar 10, 27-85
g6,P,T

Hewson, M.G. (1985). The role of intellectual environment in the origin of conceptions: An explanatory study. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 153-161
g1,g4,g6,P,T

Hewson, M.G., Hamlyn, D. (1983). The representation and analysis of conceptions of heat. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 347-354
g6,P,T

Hewson, M.G., Hamlyn, D. (1984). The influence of intellectual environment on conceptions of heat. European Journal of Science Education 6, 254-262
g2,g6,P,T

Hilscher, H., Eigenstetter-Bösl, E. (1989). Fehlvorstellungen können jeden Physikunterricht überdauern. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 281-297
g6,P,M,T,E

Hollon, R.E., Anderson, C.W. (1985). The curricular significance of college students' conceptions of heat and temperature. Paper presented at the annual meeting of the American Educational Research Association, Chicago
g6,P,T

Johnstone, A.H., McDonald, J.J., Webb, G. (1977). Misconceptions in school thermodynamics. Physics Education 12, 4, 248-251
g6,C,P,T

Kesidou, S. (1988). Schülervorstellungen zur Irreversibilität. In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1988 in Gießen. Gießen: DPG Fachausschuß Didaktik der Physik
g6,P,T,IRR

Kesidou, S. (1989). Wärmevorstellungen: Extensität, Intensität, Irreversibilität. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 145-150
g6,P,T,IRR

Kesidou, S. (1990). Schülervorstellungen zur Irreversibilität. Kiel: Universität Kiel, Mathematisch-Naturwissenschaftliche Fakultät
g3,g5,g6,P,T,EN,IRR,OCI

Manthei, U. (1980). Zur genetischen Begriffsdifferenzierung und Begriffspräzisierung. Ergebnisse einer Untersuchung am Beispiel Wärme - Temperatur. Physik in der Schule 18, 9, 389-398
g6,P,T

Manthei, U., Täubert, P. (1981). Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. Physik in der Schule 19, 7/8, 307-317
g6,P,M,T,EN

Moreira, M.A., Santos, C.A. (1981). The influence of content organization of student's cognitive structure in thermodynamics. Journal of Research in Science Teaching 18, 525-531
g5,g6,P,T

Nachmias, R., Stavy, R., Avrams, R. (1990). A microcomputer-based diagnostic system for identifying students' conception of heat and temperature. International Journal of Science Education 12, 2, 123-132
g5,g6,P,T

Nsumbu-A-Nlambu, D.M. (1986). Quelques conceptions d'eleves concernant le concept de chaleur. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 67-74
g6,P,T,OCI

Nsumbu-A-Nlambu, D.M. (1988). Concept de chaleur quelques conceptions des adolescents savoirs sur le concept et difficultes pedagogiques. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 291-299
g6,P,T

Rosenquist, M., Popp, B.D., McDermott, L.C. (1982). Some elementary conceptual difficulties with heat and temperature. Paper presented at the national meeting of the American Association of Physics Teachers in San Francisco
g6,P,T,OCI

Rozier, S., Viennot, L. (1990). Students' reasoning in thermodynamics. Tijdschrift voor Didactiek der β-wetenschappen 8, 1, 3-18
g6,P,T,AT

Shayer, M., Wylam, H. (1981). The development of the concept of heat and temperature in 10-13 year olds. Journal of Research in Science Teaching 18, 5, 419-434
g6,P,T

Stavy, R., Berkovitz, B. (1980). Cognitive conflict as a basis for teaching quantitative aspect of the concept of temperature. Science Education 64, 5, 679-692
g6,g7,P,T

Stavy, R., Strauss, S. (1983). Educational-developmental psychology and curriculum development: The case heat and temperature. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 292-303
g6,g7,P,T

Stead, K., Osborne, R. (1981). What is friction ? - Some children's ideas. The Australian Science Teacher Journal 27, 3, 51-57
g6,P,M,T,OCI

Swan, M., Jones, O.E. (1980). Comparison of students' percepts of distance, weight, height, area and temperature. Science Education 64, 3, 297-307
g6,P,T,M

Terpstra, K.J., van Sprang, H.F., Verdonk, A.H. (1989). "Hoe WARM het was en hoe ver...." - Op weg naar warmte als thermodynamisch begrip in 5-VWO ? Tijdschrift voor Didactiek der β-wetenschappen 7, 1, 3-26
g6,T,P,EN,OCI

Tiberghien, A. (1980). Modes and conditions of learning - an example: The learning of some aspects of the concept of heat. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 288-309
g6,P,T,OCI

Tiberghien, A. (1983). Critical review on the research aimed at elucidating the sense that notions of temperature and heat have for the students aged 10 to 16 years. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 75-90
g6,P,T,OCI

Tiberghien, A., Barboux, M. (1983). Difficultes de l'aquisition de la notion de temperature par les eleves de 6ieme. 5 Journees Intenationales de Chamonix Fev.
g6,P,T,OCI

Tiberghien, A., Delacote, G. (1976). Conception de la chaleur des enfants de 10 a 12 ans. In: GIREP: Proceedings of GIREP. Paris: Taylor and Francis
g6,P,T,OCI

Triplett, G. (1973). Research on heat and temperature in cognitive development. Journal of Children's Mathematical Behavior 1, 2, 27-43
g6,P,T,OCI

Vuilleumier, B. (1987). "L'homme est la mesure de toutes choses" ou les biais de la pensee commune. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 269-274
g6,P,M,T

Wiesner, H. (1985). Untersuchungen von Vorstellungen von Primarstufenschülern über Begriffe und Phänomene aus der Wärmelehre. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 242-244
g6,g7,P,T

Wiesner, H., Stengl, D. (1984). Vorstellungen von Schülern der Primarstufe zu Temperatur und Wärme. Sachunterricht und Mathematik in der Primarstufe 12, 445-452
g6,P,T,OCI

Zimmermann, M.L. (1982). Quelques representations d'eleves a propos de la chaleur. Actes des Journees Internationales sur l'Education Scientifique Volume IV
g6,P,T

Zimmermann, M.L. (1990). Concept de chaleur. Geneve: Universite de Geneve
g6,g7,P,T,OCI,OIM

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	Area of physics
M - Mechanik	- mechanics

Aguirre, J.M. (1988). Student preconceptions about vector kinematics. The Physics Teacher 26, 4, 212-216
g6,P,M

Aguirre, J.M., Rankin, G. (1989). College students' conceptions about vector kinematics. Physics Education 24, 290-294
g6,P,M

Aites, A.S., Merce, M.M. (1988). The scientific method used in physics. International Journal of Science Education 10, 1, 111-120
g6,P,M

Ameh, C.O. (1987). An analysis of teachers' and their students' views of the concept "Gravity". Research in Science Education 17, 212-219
g6,g8,P,M,OCI

Ameh, C.O. (1987). Misconceptions in science amongst Nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the quallity of life. Kiel: IPN-Materialien, 321-330
g6,g8,P,E,M

Ameh, C.O., Gunstone, R.F. (1985). Teachers' concepts in science. Research in Science Education 15, 151-157
g6,g8,P,M,E,B

Ameh, C.O., Gunstone, R.F. (1986). Science teachers' concepts in Nigeria and Australia. Research in Science Education 16, 73-81
g6,g8,P,E,M,B

Andersson, B.R. (1980). Pupils' understanding of some aspects of energy transfer. EKNA-project 1980. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6,P,M,E,T

Andersson, B.R. (1986). The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 155-171
g1,g6,P,M,E,T,O

Archenhold, W.F. (1980). An empirical study of the understanding by 16-19 year old students of the concepts of work and potential in physics. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 228-238
g6,P,M

Arons, A.B. (1981). Thinking, reasoning and understanding in introductory physic courses. The Physics Teacher 17, 166-172
g6,g7,P,M

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1987). Individual development during teacher training. Research in Science Education 17, 182-191
g6,P,M,EN

Bar, V. (1989). Introducing mechanics at the elementary school. Physics Education 24, 348-352
g6,g7,P,M

Barbetta, M.G., Loria, A., Mascellani, V., Michelini, M. (1985). An investigation on students' frameworks about motion and the concepts of force and energy. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 219-226
g6,P,M,EN

Berge, O.E., Hauke, B. (1983). Schüler Außern sich über Energie. Naturwissenschaften im Unterricht - Physik/Chemie 31, 352-355
g6,P,M,EN

Bliss, J., Morrison, I., Ogborn, J. (1988). A longitudinal study of dynamics concept. International Journal of Science Education 10, 1, 99-110
g6,P,EN,M

Bliss, J., Ogborn, J., Whitelock, D. (1989). Secondary school pupils' commonsense theories of motion. International Journal of Science Education 11, 3, 261-272
g5,g6,P,M

Boeha, B.B. (1987). Students' beliefs in science - a third world perspective. In: Riquarts, K.: Science and technology education and the quallity of life. Kiel: IPN-Materialien, 342-348
g6,P,M

Boeha, B.B. (1989). Students' beliefs and the outcomes of physics instruction. Melbourne: Monash University
g1,g5,g6,g7,P,M

Borghi, L., De Ambrosis, A., Massara, C.I., Grossi, M.G., Zoppi, D. (1988). Knowledge of air: A study of children aged between 6 and 8 years. International Journal of Science Education 10, 2, 179-188
g6,P,M,OCI

Bowden, J.A., Dall'Alba, G., Laurillard, D., Martin, E., Marton, F., Masters, G.N., Ramsden, P., Stephanou, A., Walsh, E. (1990). Phenomenographic studies of understanding in physics: Displacement, velocity and frames of reference. Paper presented at the annual meeting of the American Educational Research Association, Boston
g5,g6,P,M,OCI

Brown, D.E. (1989). Students' concept of force: the importance of understanding Newton's third law. Physics Education 24, 353-358
g6,P,M,OCI

Brown, D.E., Clement, J. (1987). Misconceptions concerning Newton's law of action and reaction: the underestimated importance of the third law. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 39-53
g6,P,M

Burashnikov, A.V., Gurevich, A.E. (1973). Analysis of pupils' knowledge of mechanics. Soviet Education 16, 160-166
g6,P,M

Caramaza, A., McCloskey, M., Green, B. (1980). Curvilinear motion in the absence of external forces: Naive beliefs about the motion of objects. Science 210, 1139-1141
g6,P,M

Caramaza, A., McCloskey, M., Green, B. (1981). Naive beliefs in "sophisticated" subjects: Misconceptions about trajectories of objects. Cognition 9, 2, 117-123
g6,P,M

Castle, F. (1985). Problem solving in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 319-328
g6,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1983). Naive knowledge and science learning. Research in Science and Technological Education 1, 2, 173-183
g1,g6,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Effecting changes in cognitive structure among physics students. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 163-187
g1,g5,g6,g7,P,M

Champagne, A.B., Gunstone, R.F., White, R.T. (1979). Knowledge of basic principles of dynamics. Melbourne: Monash University, Faculty of Education
g1,g6,P,M

Champagne, A.B., Halbwachs, F., Meheut, M. (1983). Representations and their role in learning in the fields of mechanics and transformations of matter. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 629-634
g6,C,P,M,AT

Champagne, A.B., Klopfer, L.E., Anderson, J. (1980). Factors influencing the learning of classical mechanics. American Journal of Physics 48, 1074-1079
g1,g6,g7,P,M

Champagne, A.B., Klopfer, L.E., Gunstone, R.F. (1981). Student beliefs about gravity and motion. Problem Solving 3, 12-14
g6,P,M

Champagne, A.B., Klopfer, L.E., Solomon, C.A., Cahn, A.D. (1980). Interactions of students' knowledge with their comprehension and design of science experiments. Pittsburgh: University of Pittsburg, Learning Research and Development Center
g6,P,M

Clement, J. (1977). Cataloque of students' conceptual models in physics. Section 1: Movement and forces. Amherst: University of Massachusetts, Department of Physics and Astronomy
g6,P,M

Clement, J. (1978). Cataloque of spontaneous analogies generated by students solving physics problems. Amherst: University of Massachusetts, Department of Physics and Astronomy
g6,P,M

Clement, J. (1982). Students' preconceptions in introductory mechanics. American Journal of Physics 50, 1, 66-71
g6,P,M

Clement, J. (1983). A conceptual model discussed by Galileo and used intuitively by physics students. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 325-339
g3,g6,P,M

Clement, J. (1983). Students' alternative conceptions in mechanics: A coherent system of preconceptions ? In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 310-315
g6,P,M

Clement, J. (n.d.). Student responses to a problem on Newton's first and second laws. Amherst: University of Massachusetts
g6,P,M

Clement, J., Brown, D.E., Zietsman, A. (1989). Not all preconceptions are misconceptions: finding "anchoring" conceptions' for grounding instruction on students' intuitions. International Journal of Science Education 11, 554-565
g6,P,M

Cole, H., Raven, R. (1969). Principle learning as a function of instruction on excluding irrelevant variables. Journal of Research in Science Teaching 6, 234-241
g6,P,M

Collins, A., Gentner, D. (1987). How people construct mental models. Cultural models in language and thought, 243-265
g6,P,M,AT

Cosgrove, M., Osborne, R. (1985). Physical change. Learning in Science Project. Working paper No.210. University of Waikato, 28-57
g5,g6,P,M

Cross, R.T., Mehegan, J. (1988). Young children's conception of speed: Possible implications for pedestrian safety. International Journal of Science Education 10, 3, 253-265
g6,P,M

Cross, R.T., Pitekethly, A. (1988). Speed, education and children as pedestrians: a cognitive change approach to a potentially dangerous naive concept. International Journal of Science Education 10, 5, 531-540
g6,g7,P,M,OCI

Dahncke, H. (1972). Teilaspekte der Energieerhaltung. Eine empirische Untersuchung einiger Voraussetzungen für Unterricht über das Prinzip von der Erhaltung der Energie bei 10 bis 15-jährigen Kindern. Kiel: Universtät Kiel
g6,P,M,EN

Dahncke, H., Duit, R., Niedderer, H. (1973). A hierarchy of concepts and principles, some types of learning and some results concerning the concept of energy for 5th graders in the IPN Curriculum Physik. In: Frey, K., Lang, M.: Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern: Huber, 341-365
g6,P,M,EN

Dahncke, H., Duit, R., Rhöneck, C. von (1981). Methoden und Zwecke verschiedener Untersuchungen zur Erfassung der Vorstellungen von Schülern - Die Bewegung einer Kugel in gebogenen Bahnen. In: Duit, R., Jung, W., Pfundt, H.: Alltagsvorstellungen und naturwissenschaftlicher Unterricht. Köln: Aulis, 241-280
g5,g6,P,M

Dahncke, H., Westphal, W. (1973). Methoden und Ergebnisse einer Untersuchung über Unterrichtsvoraussetzungen zum Prinzip von der Erhaltung der Energie. In: Schmidt, H.: Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Hannover: Schroedel, 105-116
g6,P,M,EN

Dawson, C.J., Rowell, J.A. (1977). Yes, children are different ! The concept of relative density and the conservation of quantities. The Australian Science Teacher Journal 23, 1, 94-96
g6,P,M

De Jong, E.J., Gunstone, R.F. (1988). A longitudinal classroom study of mechanics. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g5,g6,g7,P,M,CTL

Delorme, A., Pinard, A. (1970). Le developpement de la notion de vitesse relative. Canadian Journal of Behavioural Science 2, 2, 91-104
g6,P,M

Dentici, O.A., Grossi, M.C., Borghi, L., De Ambrosis, A., Massara, C.I (1984). Understanding floating: A study of children aged between six and eight years. European Journal of Science Education 6, 235-243
g6,P,M

Di Sessa, A.A. (1982). Unlearning Aristotelian physics: A study of knowledge based learning. Cognitive Science 6, 37-75

g6,P,M

Di Sessa, A.A. (1983). Phenomenology and the evolution of intuition. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 15-33

g1,g6,P,E,M

Dibar Ure, C.M. (1985). A study of Brazilian university freshman answers to a problem in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 234-239

g6,P,M

Dibar Ure, C.M., Colinvaux, D. (1989). Developing adults' views on the phenomenon of change of physical state in water. International Journal of Science Education 11, 2, 153-160

g6,P,M,OCI

Dickie, L.O. (1988). Preconcepts in physics. Report to the John Abbott College Research and Development Committee, Quebec

g6,P,M

Driver, R. (1973). The representation of conceptual frameworks in young adolescent science students. Urbana: University of Illinois

g6,P,M

Driver, R. (1985). Beyond appearence: The conservation of matter under physical and chemical transformations. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 145-169

g6,P,M,AT,C

Driver, R. (1985). Cognitive psychology and pupils' frameworks in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 171-198

g1,g6,P,M

Duit, R. (1981). Students' notions about the energy concept - before and after physics instruction. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 268-319

g6,P,M,EN

Duit, R. (1981). Understanding energy as a conserved quantity - remarks on the article by R.U. Sexl. European Journal of Science Education 3, 291-301

g6,P,M,EN

Duit, R. (1982). Erlernen physikalischer Begriffe im Physikunterricht - ein zu hoher Anspruch für die Sekundarstufe I ? Der mathematische und naturwissenschaftliche Unterricht 35, 283-290

g6,P,M

Duit, R. (1982). Vom Wort der Alltagssprache zum Fachterminus. Eine empirische Untersuchung zum Erlernen physikalischer Begriffe in der S I. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1982. Gießen: 1. Physikalisches Institut

g4,g6,P,M

Duit, R. (1984). Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. physica didactica 11, 129-144

g4,g6,P,M,EN

Duit, R. (1985). Work, force and power - words in everyday language and terms in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 227-233
g4,g6,P,M,EN

Duit, R., Zelewski, H.D. von (1979). Ohne Energie ist es düster in unserem Leben. Naturwissenschaften im Unterricht - Physik/Chemie 27, 161-164
g6,P,M,EN

Dupre, F., Noce, G., Vicentini-Missoni, M. (1984). Die Gestalt der Erde und die Schwerkraft: Common-Sense Wissen von Erwachsenen. physica didactica 11, 3-21
g6,P,M,AS

Eckstein, S.G., Shemesh, M. (1989). Development of children's ideas on motion: intuition vs. logical thinking. International Journal of Science Education 11, 3, 327-336
g6,P,M,OCI

Engel Clough, E., Driver, R. (1985). What do children understand about pressure in fluids ? Research in Science and Technological Education 3, 2, 133-144
g6,P,M,OCI

Engel Clough, E., Driver, R. (1986). A study of consistency in the use of students' conceptual frameworks across different task contexts. Science Education 70, 4, 24
g6,P,M,T,B

Engel Clough, E., Driver, R. (1987). How do children's scientific ideas change over time ? School Science Review, 255-267
g6,P,B,T,M

Engel, E. (1981). Investigating pupils' understanding of aspects of pressure. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the International workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 214-233
g6,P,M

Engelhardt, P., Jung, W., Wiesner, H. (1975). Welche Beziehungen sehen Studenten zwischen Begriffen aus der Mechanik bzw. Thermodynamik ? In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 249-258
g5,g6,P,M,T

Eylon, B.-S., Singer, J., Ganiel, U. (1985). Problem solving in High School - a necessary addition to the physics Curriculum. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 312-318
g6,P,M

Faucher, G. (1983). Advanced physics cources do not provide students with conceptual change. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 322-325
g6,P,E,M,MAG

Feldsine, J.E. (1987). Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 177-181
g6,g7,P,C,M

Fischbein, E., Stavy, R., Ma-Naim, H. (1987). The psycological structure of naive impetus conceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 143-151
g3,g6,P,M

Fischbein, E., Stavy, R., Ma-Naim, H. (1989). The psychological structure of naive impetus conceptions. International Journal of Science Education 11, 1, 71-81
g6,P,M

Fleshner, E.A. (1958). Psychology of the mastery and application by schoolchildren of some concepts in physics. In: Mechinskaia, N.A.: Proceedings of the symposium Psychology of Applying in School Work. Moscow: University of Moscow, 77-129
g6,P,M

Fleshner, E.A. (1963). The mastery by children of some concepts in physics. In: Simon, B., Simon, J.: Educational Psychology in the U.S.S.R. London: Routledge & Kegan Paul, 202-212
g6,P,M

Friedler, Y., Amir, R., Tamir, P. (1987). High school students' difficulties in understanding osmosis. International Journal of Science Education 9, 5, 541-551
g6,P,M

Furio Mas, C.J., Hernandez, J. (1987). Parallels between adolescents' conception of gases and the history of chemistry. Journal of Chemical Education 64, 7, 616-618
g3,g6,P,M,C

Fuschini, E., Grimellini Tomasini, N., Pecori Balandi, B. (1985). Students' frameworks in mechanics: A study of freshman. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 240-247
g6,P,M

Gamble, R. (1989). Force. Physics Education 24, 79-82
g6,P,M

Gardner, P.L. (1984). Circular motion: Some post-instructional alternative frameworks. Research in Science Education 14, 136-145
g6,P,M,OCI

Gardner, P.L. (1986). Physics students' comprehension of motion with constant velocity. The Australian Science Teachers Journal 31, 4, 27-32
g6,P,M

Gennaro, E.D. (1981). Assessing Junior High Students' understanding of density and solubility. School Science and Mathematics 81, 399-404
g6,C,P,M

Giese, P.A. (1987). Misconceptions about water pressure. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 143-148
g6,P,M

Gilbert, J.K., Osborne, R. (1979). "I understand, but I don't get it": Some problems of learning science. The School Science Review 61, 664-674
g6,P,M

Gilbert, J.K., Watts, D.M., Osborne, R. (1982). Students conceptions of ideas in mechanics. Physics Education 17, 2, 62-66
g6,P,M

Gilbert, J.K., Zylberstajn, A. (1985). A conceptional framework for science education: The case study of force and movement. European Journal of Science Education 7, 107-120
g6,P,M

Gorodetsky, M., Hoz, R. (1983). The effects of misconceptions of speed and time on the solution of speed problems. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 346-355
g6,P,M

Grimellini Tomasini, N., Gandolfi, E., Pecori Balandi, B. (1990). Teaching strategies and conceptual change: Sinking and floating at elementary school level. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,g7,P,M,OCI

Grimellini Tomasini, N., Pecori Balandi, B., Villani, A., Casadio, C., Pacca, J.L.A. (1989). Teaching strategies and conceptual change: the case of collisions in mechanics. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, California
g6,g7,P,M

Gunstone, R.F. (1984). Circular motion: Some pre-instruction alternative frameworks. Research in Science Education 14, 125-136
g6,P,M,OCI

Gunstone, R.F. (1987). Student understanding in mechanics: A large population survey. American Journal of Physics 55, 8, 691-696
g6,P,M

Gunstone, R.F., Watts, M. (1985). Force and motion. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,M

Gunstone, R.F., White, R.T. (1980). A matter of gravity. Research in Science Education 10, 35-44
g6,P,M

Gunstone, R.F., White, R.T. (1981). Understanding of gravity. Science Education 65, 291-299
g6,P,M

Halloun, J.A., Hestenes, D. (1985). Common sense concepts about motion. American Journal of Physics 53, 1056-1065
g6,P,M

Harel, G., Hoz, R. (1987). Declarative and procedural knowledge and isomorphisms of speed problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 203-210
g6,P,M

Härtel, H. (1990). Lernen und Verstehen physikalischer Konzepte: Bericht über eine Untersuchung in den Jahren 1988-89. Kiel: IPN an der Universität Kiel
g5,g6,P,M,CSC,GEN

Hashweh, M.Z. (1988). Describtive studies of students' conceptions in science. Journal of Research in Science Teaching 25, 2, 121-134
g1,g5,g6,P,M

Heidenreich, R., Jaeckel, K. (1986). Untersuchungen von Problemlösungsstrategien von Jugendlichen im physikalischen Bereich. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 175-177
g6,P,M

Hewson, M.G. (1986). The acquisition of scientific knowledge: Analysis and representation of student conceptions concerning density. Science Education 70, 2, 159-170
g1,g6,P,M

Hewson, M.G., Hewson, P.W. (1983). Effect of instruction using students' prior knowledge and conceptual change strategies in science learning. Journal of Research in Science Teaching 20, 8, 731-743
g6,g7,P,M

Hilscher, H., Eigenstetter-Bösl, E. (1989). Fehlvorstellungen können jeden Physikunterricht überdauern. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 281-297
g6,P,M,T,E

Hojnacki, S.K., Resnick, L.B. (1987). Coherence and consistency in naive physics reasoning. Paper presented at the annual meeting of the American Educational Research Association, Washington, D.C.
g6,P,M

Ivowi, U.M.O., Oludotun, J.S. (1987). An investigation of sources of misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 252-257
g6,P,M,EN

Jenelten-Allkofer, C., Duit, R. (1980). Entwicklung des Energiebegriffs bei 5- bis 16-jährigen. Naturwissenschaften im Unterricht - Physik/Chemie 12, 408-413
g6,P,M,EN

Johnson, P.E., Curran, T.E., Cox, D.L. (1971). A model for knowledge of concepts in science. Journal of Research in Science Teaching 8, 91-95
g6,P,M

Jones, A.T. (1983). Investigation of students' understanding of speed, velocity and acceleration. Research in Science Education 13, 95-104
g6,P,M

Jones, B. (1984). How solid is a solid: does it matter ? Research in Science Education 14
g6,P,M

Jones, B.L., Lynch, P.P., Reesink, C. (1989). Children's understanding of the notions of solid and liquid in relation to some common substances. International Journal of Science Education 11, 4, 417-427
g6,P,M

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (1.Teil). physica didactica 5, 3, 125-146
g1,g5,g6,P,M,EN,OCI

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (2.Teil). physica didactica 5, 4, 231-248
g1,g5,g6,P,M,EN,OCI

Jung, W. (1979). Schülervorstellungen in Mechanik. In: Härtel, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 74-76
g1,g6,P,M

Jung, W. (1979). Schülervorstellungen in Physik. Einige Ergebnisse, Deutungen und Schlußfolgerungen. Naturwissenschaften im Unterricht - Physik/Chemie 27, 80, 39-46
g6,P,M

Jung, W. (1983). Sprache und Physiklernen. Zur Beschreibung von Bewegung. Naturwissenschaften im Unterricht - Physik/Chemie 31, 10, 335-339
g5,g6,P,M

Jung, W. (1989). Und er bewegt sich doch - oder doch nicht ? In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 50-56
g6,P,M,OCI

Jung, W., Reul, H., Schwedes, H. (1977). Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg
g1,g6,g7,P,M

Jung, W., Schwedes, H. (1975). Lernschwierigkeiten im Physikunterricht. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 82-90
g1,g6,P,M

Jung, W., Wiesner, H. (1979). Zur Definition fachdidaktischer Probleme am Beispiel der Mechanik. physica didactica 6, 203-216
g6,g7,P,M

Jung, W., Wiesner, H. (1980). Wie wenden Schüler Physik an zur Erklärung alltäglicher Erscheinungen ? Untersuchungen am Beispiel der klassischen Mechanik. physica didactica 7, 147-164
g6,P,M

Jung, W., Wiesner, H. (1981). Verständnisschwierigkeiten beim physikalischen Kraftbegriff. Eine Untersuchung zum Kraftbegriff bei Physikstudenten. Physik und Didaktik 9, 2, 111-122
g6,P,M

Jung, W., Wiesner, H., Engelhardt, P. (1981). Vorstellungen von Schülern über Begriffe der Newtonschen Mechanik. Bad Salzdethfurt: Didaktischer Dienst Franzbecker
g1,g6,P,M

Kariotogloy, P., Psillos, D., Vallassiades, O. (1990). Understanding pressure: didactical transpositions and pupils' conceptions. Physics Education 25, 92-96
g6,P,M

Kass, H., Lambert, P. (1983). Student preconceptions in introductory High School physics as related to course achievement. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 374-387
g6,P,M

Kenealy, P. (1987). A syntactic source of a common "misconception" about acceleration. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 278-292
g4,g6,P,M

Kim, C.-J., Barufaldi, J.P. (1990). Students' intuitive ideas about "Water in the atmosphere": A cross age study. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g6,P,M

Kircher, E., Widl, M. (1986). Eine empirische Untersuchung zu Piagets Hypothese über die Entwicklung physikalischer Invarianzbegriffe. physica didactica 13, 2/3, 13-15
g6,P,M

Knifong, J.D. (1973). Discovering pupils' preconceptions of physical phenomena. School Science and Mathematics 73, 1, 23-28
g6,P,M,OIM,OCI

Koliopoulos, D., Kariotoglou, P., Psillos, D. (1986). La force dans le contexte des liquides; une premiere approche des conceptions des eleves sur la statique des liquides en college en grece. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 59-65
g6,P,M

Kovacs, L. (1985). How pupils think on some mechanical concepts. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 215-218
g6,P,M

Kubli, F. (1979). Piagets Methode zur Untersuchung kognitiver Entwicklungsstufen im Physikunterricht. Naturwissenschaften im Unterricht - Physik/Chemie 27, 74-78
g6,P,M

Kuiper, J. (1988). Hardnekkigheid van begripsproblemen in de mechanica. NUCN Maandblad 13, 4, 171-174
g6,P,M

Larkin, J.H. (1981). Cognition of learning physics. American Journal of Physics 49, 534-541
g1,g6,P,M

Larkin, J.H. (1983). The role of problem representation in physics. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 75-98
g1,g6,P,M

Lawson, R.A., McDermott, L.C. (n.d.). Student understanding of the work-energy and impulse-momentum theorem. Paper accepted by American Journal of Physics
g6,P,M,EN

Leboutet-Barrel, L. (1976). Concepts of mechanics among young people. Physics Education 11, 462-466
g6,P,M

Leboutet-Barrell, L. (1978). Mechanische Begriffe von Jugendlichen. physica didactica 5, 55-62
g6,P,M

Levin, I., Gardosh, R., V.N. (1987). The development of the concept of speed. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 297-301
g6,P,M

Lie, S., Sjoberg, S., Ekeland, P., Enge, M. (1985). Ideas in mechanics. A norwegian study. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 255-277
g6,P,M

Löffler, G. (1985). Sources of misconceptions. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 284-289
g6,P,M

Lovell, K. (n.d.). Understanding of scientific concepts at different developmental levels and a technique for investigating the degree of understanding. Illustrated by reference to electrostatic and gravitational. Potential
g6,P,E,M

Lybeck, L. (1985). Research into science and mathematics education at Göteborg. Mölndal: Gothenburg University, Department of Education and Educational Research
g1,g6,P,M

Lybeck, L., Strömdahl, H., Tullberg, A. (1988). A research approach to science and mathematics education developed at Göteborg: Some methodological issues in studies of students' and educators' conceptions of certain strategically chosen concepts. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 38-108
g5,g6,P,M,C,OCI

Maloney, D.P. (1984). Rule-governed approaches to physics - Newton's third law. Physics Education 19, 37-42
g5,g6,P,M

Maloney, D.P. (1988). Novice rules for projectile motion. Science Education 72, 4, 501-513

g6,P,M,GEN

Malony, D.P. (1985). Rule-governed physics: Some novice predictions. European Journal of Science Education 7, 295-306

g6,P,M

Manthei, U., Täubert, P. (1981). Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. Physik in der Schule 19, 7/8, 307-317

g6,P,M,T,EN

Maurines, L. (1987). Premieres notions sur la propagation des signaux mecaniques: analyse des difficultes des etudiants. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 57-62

g6,P,M

Mayer, M. (1987). Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 299-310

g2,g6,P,AS,M,GEN

McClelland, J.A.G. (1970). An approach to the development and assessment of instruction in Science at second grade level. The concept of energy. Ithaca, N.Y.: Cornwell University

g6,P,M,EN

McClelland, J.A.G. (1975). Earthly mechanics: Two misapprehensions and a heresy. Physics Education 10, 28-29

g6,P,M

McClelland, J.A.G. (1985). Misconceptions in mechanics and how to avoid them. Physics Education 20, 159-162

g6,P,M

McCloskey, M. (1983). Intuitive physics. Scientific American 248, 4, 114-122

g6,P,M

McCloskey, M. (1983). Naive theories of motion. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale and London: Lawrence Erlbaum, 299-324

g3,g6,P,M

McCloskey, M., Kohl, D. (1983). Naive physics: the curvilinear impetus principle and its role in interactions with moving objects. Journal of Experimental Psychology 9, 146-156

g6,P,M

McDermott, L.C. (1983). Critical review of research in the domain of mechanics. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 139-182

g6,P,M

McDermott, L.C. (1984). Research on conceptual understanding in mechanics. Physics Today 37, 6, 24-32

g6,P,M

McDermott, L.C., Rosenquist, M.L., Zee, E.H. van (1987). Student difficulties in connecting graphs and physics: examples from kinetics. American Journal of Physics 55, 6, 503-513

g6,P,M

Megarity, M.T. (1986). What does the student know ? Investigating a commonsense theory of motion. In: Lewis, R., Tagg, E.D.: Trends in computer assisted education. Oxford: Blackwell Scientific Publications, 232-234

g5,g6,P,M

Minstrell, J. (1990). A teaching system for diagnosing student' conceptions and prescribing relevant instruction. Paper prepared for a session of the American Educational Research Association titled "Classroom perspectives on conceptual change teaching", Boston
g6,g7,P,M,OCI

Mohapatra, J.K., Bhattacharyya, S. (1989). Pupils, teachers, induced incorrect generalization and the concept of "force". International Journal of Science Education 11, 4, 429-436
g6,g8,P,M,OCI

Mori, I., Kojima, M., Deno, T. (1976). A child's forming the concept of speed. Science Education 60, 4, 521-529
g6,P,M

Mori, I., Kojima, M., Tadang, N. (1976). The effect of language on a child's conception of speed: A comparative study on Japanese and Thai children. Science Education 60, 531-534
g4,g6,P,M

Mullet, E., Gervais, H. (1990). Distinction between the concepts of weight and mass in high school students. International Journal of Science Education 12, 2, 217-226
g6,P,M

Mullet, E., Montcouquiol, A. (1988). Archimedes' effect, information integration and individual differences. International Journal of Science Education 10, 3, 285-301
g6,P,M

Muralidhar, S. (1988). Solid water is denser than liquid water: Students' experiences of science lessons in Fiji. Research in Science Education 18, 276-282
g6,g8,P,M,AT

Murray, D.L. (1983). Misconceptions of osmosis. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 428-433
g6,B,P,M

Nachtigall, D. (1981). The pre-Newtonian concept of motion in the minds of students. Paper presented at the Conference on Methods of Teaching Physics, 11.- 13. November 1981, Khom Kaen University, Thailand
g6,g8,P,M,OCI

Nachtigall, D. (1982). Vorstellungen von Fünftklässlern über den freien Fall. Naturwissenschaften im Unterricht - Physik/Chemie 30, 3, 91-97
g6,P,M,OCI

Nachtigall, D. (1985). Misconceptions in physics and a strategy to overcome them. In: Lijnse, P.L.: The many faces of teaching and learning mechanics in secondary and tertiary education. Utrecht: GIREP/SVO/UNESCO, 296-302
g6,g7,P,M

Nachtigall, D. (1986). Vorstellungen im Bereich der Mechanik. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 114-118
g6,P,M

Narode, R. (n.d.). Cataloque of misconceptions from introductory mechanics: A personal account. Amherst: University of Massachusetts, Department of Physics and Astronomy
g6,P,M

Niedderer, H. (1987). Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 335-348
g6,g7,P,M,Q,CSC

Nielsen, H., Thomsen, P. (1985). Ideas about force and movement among Danish University students and candidates. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 248-254
g6,P,M

Nielsen, H., Thomsen, P.V. (1982). Fart og kraft. Aarhus: Aarhus Universitet, Det fysiske Institut
g6,P,M

Noce, G., Torosantucci, G., Vicentini-Missoni, M. (1988). The floating of objects on the moon: Prediction from a theory or experimental facts ? International Journal of Science Education 10, 1, 61-70
g6,P,M

Noce, G., Vincentini-Missoni, M. (n.d.). Investigations on the common sense knowledge of adults: Gravity and light. unpublished
g6,P,M,O,CSC

Novak, J.D. (1979). Editorial comments on "Development of Earth and Gravity Concepts Among Nepali Children". Science Education 63, 5, 719-720
g6,P,M,AS

Ogar, J. (1986). Ideas about physical phenomena in spaceships among students and pupils. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 375-378
g6,P,M,AS

Ogborn, J. (1985). Understanding students' understanding. European Journal of Science Education 7, 141-150
g1,g6,P,M

Osborne, R. (1985). Building on children's intuitive ideas. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 41-50
g6,g7,P,M

Osborne, R., Cosgrove, M. (1983). Children's conceptions of the changes of state of water. Journal of Research in Science Teaching 20, 9, 825-838
g6,P,M

Peters, P.C. (1982). Even honors students have conceptual difficulties with physics. American Journal of Physics 50, 501-508
g6,P,E,M,OCI

Piaget, J., De Lannoy, J. (1973). La formation de la notion de force. Kap. V: La transmission de l'energie entre deux pendules relies par un fil. Paris: Presses Universitaire
g6,P,M,EN

Piaget, J., Szeminska, A. (1973). La formation de la notion de force. Kap. III: Le probleme de la remontee d'use bille apres une descente. Paris: Presses Universitaire
g6,P,M

Placek, W.A. (1987). Preconceived knowledge of certain Newtonian concepts among gifted and non-gifted eleventh grade physics students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 386-391
g6,P,M

Posner, G.J., Strike, K.A. (1989). The conceptual ecology of physics learning. A poster session for presentation at the annual meeting of the American Educational Research Association, San Francisco
g6,P,M,O,CTL,CSC,GEN

Preece, P.F.W. (1977). Development trends in the continued word associations of physics students. Journal of Research in Science Teaching 14, 235-239
g6,P,M

Rafel, J., Mans, C. (1987). Alternative frameworks about the learning of changes of state of aggregation of matter: sorting of answers into models. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 392-399
g6,P,M

Ramsden, P., Masters, G.N., Bowden, J.A., Dall'Alba, G., Laurillard, D., Martin, E., Marton, F., Stephanou, A., Walsh, E. (1989). Speed, distance and time: A phenomenographic study of students' conceptions in kinematics. Paper presented at the Third European Conference for Research on Learning and Instruction, Madrid, Spain
g5,g6,P,M

Rapoport, A. (n.d.). Newtons Physik und die Flugschüler. In: Hayakawa, S.: Wort und Wirklichkeit. Darmstadt: Verlag Darmstädter Blätter, 123-146
g4,g6,P,M

Raven, R.J. (1972). The development of the concept of acceleration in Elementary School children. Journal of Research in Science Teaching 9, 201-206
g6,P,M

Renner, J.W., Abraham, M.R., Bross Grzybowski, E., Marek, E.A. (1990). Understandings and misunderstandings of eighth graders of four physics concepts found in textbooks. Journal of Research in Science Teaching 27, 1, 35-54
g6,P,M

Rhöneck, C. von (1979). Lernschwierigkeiten beim Energieerhaltungssatz der Mechanik im Zusammenhang mit Reibungsphänomenen. physica didactica 6, 221-227
g6,P,M,EN

Rhöneck, C. von (1983). Der Geschwindigkeitsbegriff von Fünftklässlern und didaktische Hilfen auf dem Weg zu v=s/t. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: 1. Physikalisches Institut, 232-237
g6,P,M,OCI

Ridgeway, D. (1988). Misconceptions and the qualitative method. The Science Teacher 55, 9, 68-71
g5,g6,P,M

Rowell, J.A., Dawson, C.J. (1977). Teaching about floating and sinking: An attempt to link cognitive psychology with classroom practice. Science Education 61, 4, 243-251
g6,P,M

Rowell, J.A., Dawson, C.J. (1977). Teaching about floating and sinking: Further studies toward closing the gap between cognitive psychology and classroom practice. Science Education 61, 4, 527-540
g6,P,M,OCI

Rowell, J.A., Renner, V.J. (1976). Quantity conceptions in university students: Another look. British Journal of Psychology 67, 1-10
g6,P,M,GEN

Ruggiero, S., Cartelli, A., Dupre, F., Vicentini-Missoni, M. (1983). Gravity and air pressure. Mental representation schemes in Middle School children. unpublished paper
g6,P,M,OCI

Ruggiero, S., Cartelli, A., Dupre, F., Vicentini-Missoni, M. (1985). Weight, gravity and air pressure: Mental representations by Italian Middle School pupils. European Journal of Science Education 7, 181-194
g6,P,M

Russell, T., Harlen, W., Watt, D. (1989). Children's ideas about evaporation. International Journal of Science Education 11, 566-576
g6,P,M,OIM

Saltiel, E. (1981). Kinematic concepts and natural reasoning: Study of comprehension of Galiean frames by science students. Doctoral Thesis, Department of Physics, University of Paris VII, France, 1978. European Journal of Science Education 3, 1, 110
g6,P,M

Salyachivin, S., Schönherr, J., Shankar, N. (1985). Students' conceptions on force. Journal of Science and Mathematics Education in Southeast Asia 13, 1, 28-31
g6,P,M

Schäfer, K. (1985). Zur Bedeutung von Schülervorstellungen für den Physikunterricht. Schriften des Deutschen Vereins zur Förderung des mathematischen und naturwissenschaftlichen Unterrichts 33, 7-17
g1,g6,P,M

Schecker, H. (1984). Das Verständnis zentraler Begriffe der klassischen Mechanik bei Schülern der 11. Jahrgangsstufe. Bremen: Universität Bremen
g6,P,M,GEN,OCI

Schecker, H. (1984). Eigenständige Schülerprozesse in Mechanik (S II). In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1984 in Münster. Gießen: DPG-Fachausschuß Didaktik der Physik, 179-184
g6,P,M

Schecker, H. (1985). Das Schülerverständnis zur Mechanik. Bremen: Universität Bremen
g1,g6,P,M

Schecker, H. (1986). Schülerinteressen und Schülervorstellungen zur Mechanik (S II). physica didactica 13, 2/3, 21-33
g6,P,M

Schecker, H., Niedderer, H. (1986). Das Vorverständnis von S-II-Schülern zur Mechanik. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 181-185
g6,P,M

Schenk, B. (1984). Entwicklung von Schülertheorien zur Mechanik in der Sekundarstufe II. physica didactica 11, 113-125
g6,P,M

Searle, P. (1985). Circular motion concepts of first year engeneering students. Research in Science Education 15, 140-150
g6,P,M,OCI

Segre, G., Gagliardi, M. (1985). Models, paradigms and misconceptions in transport processes. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 277-283
g6,P,M

Sere, M.G. (1982). A study of some frameworks used by pupils aged 11 to 13 years in the interpretation of air pressure. European Journal of Science Education 4, 3, 299-309
g6,P,M,OCI

Sere, M.G. (1985). The gaseous state. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 104-123
g6,g7,P,M,OIM,OCI

Shanon, B. (1976). Aristotelianism, Newtonianism and the physics of the layman. Perception 5, 241-243
g3,g6,P,M

Shepherd, D.L., Renner, J.W. (1982). Student understandings and misunderstandings of states of matter and density changes. School Science and Mathematics 82, 8, 650-665
g6,P,M,OCI

Simpson, M., Arnold, B. (1982). Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 65-72
g6,P,EN,M,B

Sjoberg, S., Lie, S. (n.d.). Ideas about force and movement among Norwegian pupils and students. Oslo: University of Oslo, Centre for School Science
g6,P,M

Sneider, C., Pulos, S. (1983). Children's cosmographies: Understanding the earth's shape and gravity. Science Education 67, 2, 205-221
g6,P,M,AS

Solomon, J. (n.d.). Background ideas about energy. London: Chelsea College, Centre for Science Education
g6,P,M,EN,OCI

Solomon, J. (1982). How children learn about energy or does the first law come first ? The School Science Review 63, 224, 415-422
g6,g7,P,M,EN,OCI

Solomon, J. (1983). Learning about energy: How pupils think in two domains. European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Stavy, R. (1987). Children's conception of change in the state of matter: From liquid (or solid) to gas. Paper of the School of Education, Tel-Aviv University
g6,P,M

Stavy, R. (1988). Children's conception of gas. International Journal of Science Education 10, 5, 553-560
g6,P,M,AT

Stavy, R. (1989). Students' conceptions of matter. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 273-282
g6,P,M,AT

Stavy, R., Stachel, D. (1985). Children's ideas about "solid" and "liquid". European Journal of Science Education 7, 407-421
g6,P,M

Stead, K., Osborne, R. (1981). What is friction ? - Some children's ideas. The Australian Science Teacher Journal 27, 3, 51-57
g6,P,M,T,OCI

Stead, K.E., Osborne, R.J. (1981). What is gravity ? Some children's ideas. New Zealand Science Teacher, 30, 5 ff
g6,P,M

Stepans, J., Dyche, S. (1987). Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 466-480
g6,g7,P,M,B

Stepans, J.I., Beiswenger, R.E., Dyche, S. (1986). Misconceptions die hard. The Science Teacher 53, 9, 65-69
g6,P,M

Sujak-Lesz, K. (1986). Physikalisches Denken von Schülern in der Grundstufe des systematischen Physikunterrichts. physica didactica 13, 2/3, 17-20
g6,P,M

Swan, M., Jones, O.E. (1980). Comparison of students' percepts of distance, weight, height, area and temperature. Science Education 64, 3, 297-307
g6,P,T,M

Terry, C., Jones, G. (1986). Alternative frameworks: Newton's third law and conceptual change. European Journal of Science Education 8, 3, 291-298
g6,g7,P,M

Terry, C., Jones, G., Hurford, W. (1985). Children's conceptual understanding of forces and equilibrium. Physics Education 20, 162-165
g6,P,M

Thisjs, G.D. (1987). Conceptions of force and movement: intuitive ideas of pupils in Zimbabwe in comparison with findings from other countries. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 501-513
g6,P,M

Thorley, N.R., Treagust, D.F. (1987). Conflict within dyadic interactions as a stimulant for conceptual change in physics. International Journal of Science Education 9, 2, 203-216
g6,g7,P,M,E

Touger, J., Dufresne, R., Gerace, W., Mestre, J. (1987). Hierarchial organization of knowledge and coherent explanation in the domain of elementary mechanics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 517-530
g6,P,M

Treffer, R. (1990). Fehlkonzepte erkennen durch Faktoranalyse von Multiple-Choice-Fragen - eine schnelle Möglichkeit zur Kontrolle von Lernerfolgen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 314-316
g6,P,M

Trowbridge, D.E., McDermott, L.C. (1981). Investigation of student understanding of the concept of acceleration in one dimension. American Journal of Physics 49, 242-253
g6,P,M,OCI

Tschacher, W., Tergan, S.O., Mandl, H. (1988). Fehlkonzepte im physikalischen Gegenstandsbereich der Bewegungsüberlagerung. Forschungsberichte des Deutschèn Instituts für Fernstudien an der Universität Tübingen, 49
g6,P,M

van den Berg, J., Raat, J. (1985). Problem solving in mechanics - An experiment in mechanics teaching. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 329-335
g6,g7,P,M

Van Hise, Y.A. (1988). Student misconceptions in mechanics: An international problem ? The Physics Teacher 26, 11, 498-502
g6,g7,P,M

Vanderlocht, M., Van Damme, J. (1989). Fouten en knelpunten bij het oplossen van problemen over de projectielbeweging. Tijdschrift voor Didactiek der β-wetenschappen 7, 2, 115-137
g6,P,M

Vegting, P. (1985). Concept development in pupils. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 290-302
g6,P,M

Viennot, L. (1974). Sens physique et raisonnement formel in dynamique elementaire. Encart Pedagogique, 35-46
g6,P,M

Viennot, L. (1976). Mouvement et force chez les etudiants de premier cycle universitaire. Le pendule simple. Bulletin de la Societe Francaise de Physique. Encart Pedagogique 2, 35-46
g6,P,M

Viennot, L. (1978). Le raisonnement spontane en dynamique elementaire. Revue Francaise de Pedagogie 45, 16-24
g6,P,M

Viennot, L. (1979). Le raisonnement spontane en dynamique elementaire. Paris: Herman
g6,P,M

Viennot, L. (1979). Spontaneous reasoning in elementary dynamics. European Journal of Science Education 1, 2, 205-221
g6,P,M

Viennot, L. (1980). Spontaneous reasoning in elementary dynamics. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 273-274
g6,P,M

Viennot, L. (1983). Natural tendencies in analysing students' reasoning two instances in mechanics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 239-244
g1,g6,P,M

Viennot, L. (1985). Analysing students' reasoning in science: A pragmatic view of theoretical problems. European Journal of Science Education 7, 2, 151-162
g1,g5,g6,P,M

Viennot, L. (1985). Analyzing students' reasoning: Tendencies in interpretation. American Journal of Physics 53, 432-436
g6,P,M

Von Pfuhl Rodrigues, D.M.A. (1980). Notions of physical laws in childhood. Science Education 64, 1, 59-84
g6,P,M

Voorde, H.H. ten (1979). Education based on a new concept of teaching. Paper represented at the "Cognitive Development-Research Seminar, Science and Mathematics Education", Leeds
g6,P,M

Vuilleumier, B. (1987). "L'homme est la mesure de toutes choses" ou les biais de la pensee commune. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 269-274
g6,P,M,T

Warren, J.W. (1979). Understanding force. London: Murray
g6,P,M

Watts, D.M. (1980). An exploration of student's understanding of the concepts "force" and "energy". Paper represented at the International Conference on Education for Physics Teaching, Trieste
g6,P,M,EN,OCI

Watts, D.M., Gilbert, J.K. (1983). Enigmas in school science: students' conceptions for scientifically associated words. Research in Science and Technological Education 1, 2, 161-171
g4,g6,P,M,EN,OCI

Watts, M. (1982). Gravity - Don't take it for granted ! Physics Education 17, 116-121
g6,P,M

Watts, M. (1983). A study of schoolchildren's alternative frameworks of the concept of force. European Journal of Science Education 5, 2, 217-230
g6,P,M,OCI

Watts, M. (1983). Using networks to represent pupils' meanings for concepts of force and energy. In: Bliss, J., Monk, M., Ogborn, J.: Qualitative data analysis for educational research. Canberra: Croom Helm, 89-96
g6,P,M,EN,OCI

Watts, M., Zylbersztajn, A. (1981). A survey of some children's ideas about force. Physics Education 16, 360-365
g6,P,M

Weber, K. (1989). Schülervorstellungen über Bewegung und Kraft. Physik in der Schule 27, 1/2, 19-24
g6,P,M,OCI

Weerda, J. (1981). Zur Entwicklung des Gasbegriffs beim Kinde. Naturwissenschaften im Unterricht - Physik/Chemie 29, 3, 90-98
g6,P,M

Wells, J. (1972). Some aspects of adolescent thinking in science. Educational Review 24, 3, 212-224
g6,P,M,C,OCI

Whitaker, R.J. (1983). An examination of student inconsistencies in their understanding of trajectory motion. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 402-406
g6,P,M

Whitaker, R.J. (1983). Aristotle is not dead: Student understanding of trajectory motion. American Journal of Physics 51, 4, 352-357
g6,P,M

White, B. (1983). Sources of difficulty in understanding Newtonian dynamics. Cognitive Science 7, 41-65
g6,P,M

White, J.E., Glynn, S.M. (1990). Teaching children science: The implications of prior knowledge. Paper presented at South Eastern Psychological Association, Atlanta GA
g6,P,M

Whitelock, D. (1988). Repertory grid elicitation: A potential tool for studying secondary school pupils' ideas in dynamics ? In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 233-244
g5,g6,P,M

Wilkening, F. (in press). Integrating velocity, time, and distance information: A developmental study. Cognitive Psychology
g6,P,M

Zeyer, G. (1981). Vorstellungen von Erwachsenen zum freien Fall. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: I. Physikalisches Institut
g6,P,M

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik **Area of physics**
O - Optik **- optics**

Anderson, C.W., Smith, E.L. (1983). Children's conceptions of light and color: Understanding the concept of unseen rays. East Lansing: Michigan State University
g6,g7,P,O

Anderson, C.W., Smith, E.L. (1984). Children's preconceptions and content-area textbooks. In: Duffy, G., Roehler, L.R., Mason, J.: Comprehension instruction: Perspectives and suggestions. New York: Longman, 187-201
g6,g7,P,O,B

Andersson, B.R. (1986). The experiental gestalt of causation: a common core to pupils preconceptions in science. European Journal of Science Education 2, 155-171
g1,g6,P,M,E,T,O

Andersson, B.R., Kärrqvist, C. (1982). Light and its properties. The pupil's perspective. EKNA-report No.8. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6,P,O

Andersson, B.R., Kärrqvist, C. (1983). How Swedish pupils, aged 12-15 years, understand light and its properties. European Journal of Science Education 5, 4, 387-402
g6,P,O

Andersson, J.A. (1988). Ungdomsskoleelevers forstaelse av hvordan synssansen fungerer. Oslo: Senter for Realfagsundervisning, Universitetet i Oslo
g6,P,O

Ault, C.R. (1987). Interview studies in teacher education: examples from extraordinary contexts. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 25-29
g1,g6,P,O,S

Barth, N. (1986). Von der Schwierigkeit, optische Phänomene sinnvoll zu beschreiben. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 81-86
g6,P,O

Benyamna, S. (1987). La pregnance du modele particulaire dans les representations d'etudiants en science, a l'egard de phenomenes naturels. Quebec: Universite Laval
g6,P,AT,O,E

Berck, M., Jung, W. (1990). Akzeptanzbefragungen zur Abbildung durch Sammellinsen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 281-283
g6,P,O

Blumör, R., Heisl, W., Jung, W., Wiesner, H. (1987). Schülervorstellungen und Lernprozesse im Bereich der Optik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Oldenburg 1986. Alsbach: Leuchtturm, 226-228
g6,P,O

Blumör, R., Jung, W., Wiesner, H. (1989). Schülervorstellungen zum Bereich "Sehen und Licht". Ergebnisse schriftlicher und mündlicher Befragungen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 228-230
g5,g6,P,O

Bouwens, R.E.A. (1987). Misconceptions among pupils regarding geometrical optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 23-38
g6,P,O,GEN

Bouwens, R.E.A., Verkerk, G. (1988). Inventarisatie van misconcepties in de optica. Tijdschrift voor Didactiek der β-wetenschappen 6, 2, 83-98
g6,P,O

Claus, J., Stork, E., Wiesner, H. (1982). Optik im Sachunterricht. Eine empirische Untersuchung zu Vorstellungen und Lernprozessen. Sachunterricht und Mathematik in der Primarstufe 10, 82-92
g6,g7,P,O

Eaton, J.F., Anderson, C.W., Smith, E.L. (1983). When students don't know they don't know. Science and Children 20, 7, 7-9
g6,P,O,B

Eaton, J.F., Anderson, C.W., Smith, E.L. (1984). Students' misconceptions interfere with science learning: Case studies of fifth-grade students. The Elementary School Journal 84, 4, 365-379
g6,g7,P,O

Esgalhado, A., Rebordao, J. (1987). A propos de modeles "spontanes" de phenomenes lies a la lumiere. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 304-308
g6,P,O

Feher, E., Rice, K. (1985). Development of scientific concepts through the use of interactive exhibits in a museum. American Museum of Natural History, 35-46
g5,g6,P,O

Feher, E., Rice, K. (1987). A comparison of teacher student conceptions in optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 108-117
g6,g8,P,O

Feher, E., Rice, K. (1988). Ein Vergleich optischer Vorstellungen von Lehrern und Schülern. physica didactica 15, 2, 3-20
g6,g8,P,O,OIM,OCI

Feher, E., Rice, K. (1988). Shadows and anti-images: Children's conceptions of light and vision. II. Science Education 72, 5, 637-649
g6,P,O,OCI,OIM

Fetherstonhaugh, A.R. (1988). Students' understanding of light: Can teaching for conceptual change lower the level of misconception ? Perth, Western Australia: Curtin University of Technology
g5,g6,g7,P,O,OCI

Fetherstonhaugh, A.R., Happs, J.C. (1988). Countering fundamental misconceptions about light. An analysis of specific teaching strategies with year 8 students. Research in Science Education 18, 211-219
g6,g7,P,O,OCI

Fetherstonhaugh, A.R., Happs, J.C., Treagust, D.F. (1987). Student misconceptions about light: A comparative study of prevalent views found in Western Australia, France, New Zealand, Sweden and the United States. Research in Science Education 17, 156-164
g6,P,O

Fetherstonhaugh, T., Treagust, D.F. (1990). Students' understanding of light and its properties following a teaching strategy to engender conceptual change. Paper presented at the Special Interest Group on Subject Matter Knowledge and Conceptual Change of the annual meeting of the A.E.R.A., Boston, MA, 16-20 April 1990
g6,g7,P,O

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Goldberg, F.M., McDermott, L.C. (1986). Student difficulties in understanding image formation by a plane mirror. The Physics Teacher 24, 8, 472-480
g6,g7,P,O

Goldberg, F.M., McDermott, L.C. (1987). An investigation of student understanding of the real image formed by a converging lens or concave mirror. American Journal of Physics 55, 2, 108-119
g6,P,O

Guesne, E. (1984). Die Vorstellung von Kindern über Licht. physica didactica 11, 79-98
g6,P,O

Guesne, E. (1985). Light. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 10-33
g6,g7,P,O

Guesne, E., McDermott, L.C. (1983). Students' conceptions and learning in the fields of light and heat. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 577-579
g6,P,T,O

Guesne, E., Tiberghien, A., Delacote, G. (1978). Methods et resultats concernant l'analyse des conceptions des eleves dans differents domaines de la physique. Deux exemples: les notions de chaleur et lumiere. Revue Francaise de Pedagogie 45, 25-36
g6,P,T,O

Hoffmann, K., Wiesner, H. (1982). Lassen sich Alltagsvorstellungen über optische Phänomene durch Unterricht wirksam korrigieren ? physica didactica 9, 299-317
g6,g7,P,O

Hoffmann, K., Wiesner, H. (1984). Ein subjektivistischer Zugang zur Optik in der Sekundarstufe I. Bericht über einen Unterrichtsversuch zur Vermittlung der Sender-Empfänger-Vorstellung. Naturwissenschaften im Unterricht - Physik/Chemie 32, 7-11
g6,g7,P,O

Jung, W. (n.d.). Vorstellungen von Schülern über Sehen und Licht. Ergebnisse von Untersuchungen an Schülern in 6. bis 10. Klassen. Polykopiert
g6,P,O

Jung, W. (1981). Conceptual frameworks in elementary optics. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 441-448
g6,P,O

Jung, W. (1981). Ergebnisse einer Optik-Erhebung. physica didactica 8, 1, 19-34
g6,P,O

Jung, W. (1981). Erhebungen zu Schülervorstellungen in Optik (Sekundarstufe I). physica didactica 8, 137-153
g6,P,O

Jung, W. (1981). Zum Anfangsunterricht in Optik: Untersuchungen und didaktische Konsequenzen. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: 1. Physikalisches Institut, 433-439
g1,g6,P,O

Jung, W. (1982). Fallstudien zur Optik. physica didactica 9, 199-220
g6,P,O

Jung, W. (1987). Licht, Strahlung, Spiegelbild. Ergebnisse einer schriftlichen Erhebung. physica didactica 1987, 14, 19-33
g6,P,O

Jung, W. (1987). Understanding students' understanding: the case of elemantary optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 268-277
g5,g6,P,O

Jung, W. (1987). Verständnisse und Mißverständnisse. physica didactica 14, 1/2, 23-30
g1,g5,g6,P,O

Jung, W. (1989). Phänomenologisches vs physikalisches optisches Schema als Interpretationsinstrumente bei Interviews. physica didactica 16, 4, 35-46
g1,g5,g6,P,O

Jung, W. (n.d.). Untersuchungen zur elementaren Optik. Schriftliche Erhebungen und Interviews. Frankfurt/Main: Universität Frankfurt, Institut für Didaktik der Physik
g6,P,O

Jung, W. (n.d.). Versuche mit der Methode des "Lauten Denkens" bei physikalischen Problemen. Frankfurt/Main: Universität Frankfurt, Institut für Didaktik der Physik
g5,g6,P,O,E

Jung, W., Wiesner, H. (1990). Ergebnisse von Akzeptanzbefragungen zu den Bereichen "Sehen" und "Farben" der elementaren Optik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 278-280
g6,P,O

Kärrqvist, C. (1983). How Swedish pupils, age 12-15, understand light and its properties. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 362-373
g6,P,O

La Rosa, C., Mayer, M., Patrizi, P., Vicentini-Missoni, M. (1984). Commonsense knowledge in optics: Preliminary results of an investigation into the properties of light. European Journal of Science Education 6, 387-397
g6,P,O

Lefevre, R. (1987). Modeles de la lumiere: les conceptions des etudiants de 1ere annee universitaire. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 297-302
g6,P,O

Lefevre, R., Escant, A. (1986). Intervention de l'optique dans la vie quotidienne en relation avec les conceptions. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 75-81
g6,P,O

Mohapatra, J.K. (1988). Induced in incorrect generalizations leading to misconcepts - an exploratory investigation about the laws of reflection of light. Journal of Research in Science Teaching 25, 9, 777-784
g6,P,O

Noce, G., Vicentini-Missoni, M. (1982). Investigations on the common sense knowledge of adults: Gravity and light. In: Wanehoo, V.N. (Ed.): World views on science education. Oxford: IBH Publ. Co, 306-315
g6,P,AS,O

Noce, G., Vincentini-Missoni, M. (n.d.). Investigations on the common sense knowledge of adults: Gravity and light. unpublished
g6,P,M,O,CSC

Palacios, F.J.P., Cazorla, F.N., Madrid, A.C. (1989). Misconceptions on geometric optics and their association with relevant educational variables. International Journal of Science Education 11, 3, 273-286
g6,P,O

Posner, G.J., Strike, K.A. (1989). The conceptual ecology of physics learning. A poster session for presentation at the annual meeting of the American Educational Research Association, San Francisco
g6,P,M,O,CTL,CSC,GEN

Rice, K., Feher, E. (1987). Pinholes and images: children's conceptions of light and vision I. Science Education 71, 4, 629-639
g6,P,O

Shapiro, B.L. (1989). What children bring to light: Giving high status to learners' views and actions in science. Science Education 73, 6, 711-733
g5,g6,P,O,CSC,CTL,OCI

Siemsen, F. (1981). Das Himmelsblau. physica didactica 8, 131-163
g6,P,O

Stead, B., Osborne, R. (1979). Exploring students' concept of light. Paper presented to the New Zealand Association for Research in Education Conference, Wellington
g6,P,O

Stead, B., Osborne, R. (1980). Light. Working Paper No. 23, University of Waikato, Learning in Science Project, 1-24
g6,P,O

Tiberghien, A., Delacote, G., Ghiglionne, R., Matalon, B. (in press). Conception de la lumiere chez les enfants de 10-12 ans. Revue Francaise de Pedagogie
g6,P,O

van den Berg, E., Sundaru (1990). Student ideas on the velocity of light. The Australian Science Teachers Journal 36, 2, 72-75
g6,P,O

Watts, M. (1985). Students' conceptions of light - a case study. Physics Education 20, 183-187
g6,P,O

Wickihalter, R. (1983). Schülervorstellungen zum Sehen. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: 1. Physikalisches Institut, 238-243
g6,P,O

Wiesner, H. (1986). Schülervorstellungen und Lernschwierigkeiten im Bereich der Optik. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 25-29
g6,P,O,OCI

Wiesner, H., Claus, J. (1985). Vorstellungen zu Licht und Schatten bei Schülern der Primarstufe. Sachunterricht und Mathematik in der Grundschule 13, 318-322
g6,P,O,OCI

Wubbels, T. (1986). Elementaire begrippen in de geometrische optica: leerlingenvoorstellingen en schoolboekteksten. Tijdschrift voor Didactiek der β-wetenschappen 4, 1, 19-37
g6,P,O,OCI

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik **Area of physics**
AT - Atome / Teilchen **- atoms / particles**

Andersson, B. (1990). Pupils' conceptions of matter and its transformations (age 12-16). Studies in Science Education 18, 53-85
g6,g7,P,AT,C

Ault, C.R., Novak, J.D., Gowin, D.B. (1984). Constructing vee maps for clinical interviews on molecule concepts. Science Education 68, 441-462
g5,g6,P,AT

Bayer, H.J. (1985). Schülervorstellungen über das Atom in der Sekundarstufe II. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 265-267
g6,P,AT

Bayer, H.J. (1986). Schülervorstellungen beim Übergang vom Bohrschen zum wellen-mechanischen Atommodell. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1986 in Gießen. Gießen: DPG-Fachausschuß Didaktik der Physik, 249-256
g6,P,AT,Q

Benyamna, S. (1987). La pregnance du modele particulaire dans les representations d'etudiants en science, a l'egard de phenomenes naturels. Quebec: Universite Laval
g6,P,AT,O,E

Berkheimer, G.D., Anderson, C.W., Spees, S.T. (1988). Using conceptual change research to reason about curriculum. East Lansing: Michigan State University
g6,g7,P,AT

Bethge, T. (1988). Aspekte des Schülervorverständnisses zu grundlegenden Begriffen der Atomphysik - Eine empirische Untersuchung in der Sekundarstrufe II. Bremen: Universität Bremen
g1,g6,P,Q,AT,EN,CSC

Bleichroth, W. (1965). Was wissen unsere Volksschulkinder vom Atom ? Zeitschrift für Naturlehre und Naturkunde 13, 89-94
g6,P,AT

Born, G. (1976). Der Atombegriff unserer Schüler. Physik und Didaktik 1, 66-71
g6,P,AT

Brook, A., Briggs, H., Driver, R. (1984). Aspects of secondary students' understanding of the particulate nature of matter. Leeds: University Leeds, Centre for Studies in Science and Mathematics Education
g6,P,AT

Champagne, A.B., Halbwachs, F., Meheut, M. (1983). Representations and their role in learning in the fields of mechanics and transformations of matter. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 629-634
g6,C,P,M,AT

Collins, A., Gentner, D. (1987). How people construct mental models. Cultural models in language and thought, 243-265
g6,P,M,AT

Cros, D., Chastrette, M., Fayol, M. (1988). Conceptions of second year university students of some fundamental notions in chemistry. International Journal of Science Education 10, 3, 331-336
g6,P,AT,C

Cros, D., Maurin, M. (1986). Conceptions of first-year university students of the constituents of matter and the notions of acids and bases. European Journal of Science Education 8, 3, 305-313
g6,P,AT,C

Dahlmann, W. (1984). Zur Vorstellung vom kontinuierlichen bzw. vom diskontinuierlichen Aufbau der Materie. Eine empirische Untersuchung in der Sekundarstufe. 2. Teil. chimica didactica 10, 223-271
g6,P,AT

Driver, R. (1983). An approach to documenting the understanding of 15 years old british children about the particulate theory of matter. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 339-346
g6,P,AT

Driver, R. (1985). Beyond appearence: The conservation of matter under physical and chemical transformations. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 145-169
g6,P,M,AT,C

Eijkelhof, H.M.C., Klaassen, C.W.J.M., Lijnse, P.L., Scholte, R.L.J. (1990). Perceived incidence and importance of lay-ideas on ionizing radiation: Results of a Delphi-Study among radiation-experts. Science Education 74, 2, 183-195
g6,P,AT,STS

Fritsch, L., Ehlert, M. (1990). Vorstellungen der Schüler vom Bau der Stoffe. Chemie in der Schule 37, 4, 118-127
g6,P,AT,C

Furio Mas, C.J., Hernandez-Perez, J. (1987). Instabilite des conceptions alternatives des eleves du primaire et du secondaire sur les gaz. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 345-350
g6,P,AT

Gabel, D.L., Samuel, K.V., Hunn, D. (1987). Understanding the particulate nature of matter. Journal of Chemical Education 64, 8, 695-697
g6,P,AT

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Grützmann, F. (1980). Die Vorstellung von "Teilchen versus Kontinuum" und "Erhaltung" bei Schülern des 7. bis 9. Jahrgangs zu Versuchen mit Verdunsten, Kondensieren, Lösen, Kristallisieren. Kiel: Universität Kiel
g6,C,P,AT

Haidar, A.H., Abraham, M.R. (1989). A comparison of applied and theoretical knowledge of concepts based on the particulare nature of matter. University of Oklahoma: Department of Chemistry and Biochemistry
g6,P,AT,C

Hänsel, H. (1989). Auffassungen und innere Modelle der Schüler vom Bau der Stoffe als Grundlage für eine differenzierte Führung im Chemieanfangsunterricht. Rostock: Universität Rostock
g6,C,P,AT

Hibbard, K.M., Novak, J.D. (1975). Audio-tutorial elementary school science instruction as a method for study of children's concept learning: Particulate nature of matter. Science Education 59, 4, 559-570
g6,P,AT

Holding, B. (1987). Investigation of schoolchildren's understanding of the process of dissolving with special reference to the conservation of matter and the development of atomistic ideas. Leeds: The University of Leeds, School of Education
g1,g3,g6,P,AT,C

Kircher, E. (1981). Research in the classroom about the particle nature of matter (grades 4-6). In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 342-364
g6,P,AT

Kircher, E. (1982). Untersuchungen im Unterricht über "Kleinste Teilchen" (Atome). Der Physikunterricht 16, 1, 35-50
g6,P,AT

Kircher, E. (1986). Vorstellungen über Atome. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 34-37
g6,P,AT

Kircher, E., Heinrich, P. (1984). Eine empirische Untersuchung über Atomvorstellungen bei Hauptschülern im 8. und 9. Schuljahr. chimica didactica 10, 199-222
g6,P,AT

Knote, H. (1975). Zur Atomvorstellung bei Dreizehn- bis Fünfzehnjährigen. Der Physikunterricht 4, 86-96
g6,P,AT

Linder, C.J., Erickson, G.L. (1989). A study of tertiary physics students' conceptualizations of sound. International Journal of Science Education 11, 491-501
g5,g6,P,S,AT

Löffler, G. (1990). Über die Auffassung von Teilchen, die Schüleräußerungen zugrunde liegt. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 229-231
g6,P,AT

Mitchell, I., Gunstone, R. (1984). Some student conceptions brought to the study of stoichiometry. Research in Science Education 14, 78-88
g6,P,AT,C,OCI

Muralidhar, S. (1988). Solid water is denser than liquid water: Students' experiences of science lessons in Fiji. Research in Science Education 18, 276-282
g6,g8,P,M,AT

Nicholson, J.R., Phinios, D. (n.d.). Matter and models of matter: A pilot study into pupils confusion. In: Kornhauser, A., Kholodilin, A.N.: Natural sciences - social sciences interface. Educational aspects. Ljubljana, 315-325
g6,P,AT

Nöding, S. (1969). Was stellen sich die Schüler der Unter- und Mittelstufe unter einem Atom vor ? Der mathematische und naturwissenschaftliche Unterricht 22, 365-367
g6,P,AT,GEN,OCI

Novick, S., Nussbaum, J. (1978). Junior High School pupils' understanding of the particulate nature of matter: An interview study. Science Education 62, 273-281
g6,P,AT,OCI

Novick, S., Nussbaum, J. (1981). Pupils' understanding of the particulate nature of matter: A cross-age study. Science Education 65, 187-196
g6,P,AT

Nussbaum, J. (1985). The particulare nature of matter in the gaseous phase. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,AT

Osborne, R., Schollum, B. (1983). Coping in chemistry. The Australian Science Teachers Journal 29, 1, 13-24
g6,g7,P,AT,C,OCI

Pfundt, H. (1981). Das Atom - letztes Teilungsstück oder erster Aufbaustein ? Zu den Vorstellungen, die sich Schüler vom Aufbau der Stoffe machen. chimica didactica 7, 75-94
g6,P,AT

Pfundt, H. (1982). Untersuchungen zu den Vorstellungen, die Schüler vom Aufbau der Stoffe entwickeln. Der Physikunterricht 16, 1, 51-65
g6,P,AT

Prieto, T., Blanco, A., Rodriguez, A. (1989). The ideas of 11 to 14-year-old students about the nature of solutions. International Journal of Science Education 11, 4, 451-463
g6,P,AT,C,OIM

Rennström, L. (1987). Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 400-414
g5,g6,P,C,AT

Rhöneck, C. von (1982). Schüleräußerungen zum Problem der Volumenverminderung beim Mischen von Spiritus und Wasser. Der Physikunterricht 16, 1, 66-76
g6,P,AT

Rhöneck, C. von (1989). Zum psychologischen Aspekt des Physiklernens. In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität, Zentralinstitut für Fachdidaktiken, 77-88
g6,P,AT,Q,OIM

Riesch, W., Westphal, W. (1975). Modellhafte Schülervorstellungen zur Ausbreitung radioaktiver Strahlung. Der Physikunterricht 9, 75-85
g6,P,AT,OCI

Rozier, S., Viennot, L. (1990). Students' reasoning in thermodynamics. Tijdschrift voor Didactiek der β-wetenschappen 8, 1, 3-18
g6,P,T,AT

Schollum, B., Happs, J.C. (1982). Learner's views about burning. The Australian Science Teachers Journal 28, 3, 84-88
g6,P,AT,C

Schollum, B., Osborne, R.J. (1985). Relating the new to the familiar. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 51-65
g6,g7,P,AT

Scott, P. (1987). The process of conceptual change in science: a case study of the development of a secondary pupil's ideas relating to matter. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 404-419
g6,g7,P,AT

Selley, N.J. (1981). Scientific models and theories: Case studies of the practice of school science teachers. European Journal of Science Education 3, 1
g6,P,AT

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Stavy, R. (1988). Children's conception of gas. International Journal of Science Education 10, 5, 553-560
g6,P,M,AT

Stavy, R. (1989). Students' conceptions of matter. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 273-282
g6,P,M,AT

Strauss, M.J., Levine, S.H. (1986). Symbolism, science and developing minds. Journal of College Science Teaching 15, 190-195
g6,P,AT,OCI

Swartz, C.E. (1973). Comment on "Misconceptions of selected science concept held by Elementary School students". Journal of Research in Science Teaching 10, 383-384
g6,P,AT

Wightman, T., Green, P., Scott, P. (1986). Children's learning in science project. The construction of meaning and conceptual change in classroom settings: Case studies on the particulate nature of matter. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,g7,P,AT

g6 UTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik AS - Astronomie	Area of physics - astronomy

Baxter, J. (1989). Children's understanding of familiar astronomical events. International Journal of Science Education 11, 502-513
g6,P,AS

De Vecchi, G. (1986). Comment on voit l'espace quand on est un enfant qui a les pieds sur terre. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 421-425
g6,P,AS

Dupre, F., Noce, G., Vicentini-Missoni, M. (1984). Die Gestalt der Erde und die Schwerkraft: Common-Sense Wissen von Erwachsenen. physica didactica 11, 3-21
g6,P,M,AS

Finegold, M., Pundak, D. (1990). Students' conceptual frameworks in astronomy. The Australian Science Teachers Journal 36, 2, 76-83
g6,P,AS

Jones, B., Lynch, P.P., Reesink, C. (1987). Children's conceptions of the earth, sun and moon. International Journal of Science Education 9, 1, 43-53
g6,P,AS,GEN

Klein, C.A. (1982). Children's concepts of the earth and the sun: A cross cultural study. Science Education 65, 1, 95-107
g6,P,AS,OCI

Kubli, F. (1983). Kosmosvorstellungen als Indikatoren für kindliche Denkprozesse. physica didactica 10, 131-147
g6,P,AS

Kubli, F. (1984). Kosmosvorstellungen von Kindern und die Astronomie im Unterricht. In: Hameyer, U., Kapune, T.: Weltall und Weltbild. Kiel: Schmidt & Klaunig, 75-96
g6,P,AS

Lightman, A., Sadler, P. (1988). The earth is round ? Who are you kidding ? Science and Children 25, 5, 24-26
g6,P,AS

Lightman, A.P., Miller, J.D., Leadbeater, B.J. (1987). Contemporary cosmological beliefs. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 309-321
g6,P,AS,GEN

Mali, G.B., Howe, A. (1979). Development of earth and gravity concepts among Nepali children. Science Education 63, 5, 685-691
g6,P,AS

Mayer, M. (1987). Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 299-310
g2,g6,P,AS,M,GEN

Noce, G., Vicentini-Missoni, M. (1982). Investigations on the common sense knowledge of adults: Gravity and light. In: Wanehoo, V.N. (Ed.): World views on science education. Oxford: IBH Publ. Co, 306-315
g6,P,AS,O

Novak, J.D. (1979). Editorial comments on "Development of Earth and Gravity Concepts Among Nepali Children". Science Education 63, 5, 719-720
g6,P,M,AS

Nussbaum, J. (1979). Children's conception of the earth as a cosmic body: A cross-age study. Science Education 63, 83-93
g6,P,AS

Nussbaum, J. (1985). The earth as a cosmic body. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,AS,OCI

Nussbaum, J. (1986). Students perceptions of astronomical concepts. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 87-97
g6,P,AS,OCI

Nussbaum, J., Novak J.D. (1978). Interviews zur Beurteilung der Vorstellung von Kindern über die Erde. physica didactica 5, 33-51
g6,P,AS,OCI

Nussbaum, J., Novak, J.D. (1976). An assessment of children's concepts of the earth utilizing structured interviews. Science Education 60, 4, 535-550
g6,P,AS,OCI

Nussbaum, J., Sharodini-Dagan, N. (1983). Changes in second grade children's preconceptions about the earth as a cosmic body resulting from a short series of audio-tutorial lessons. Science Education 67, 99-114
g6,g7,P,AS

Ogar, J. (1986). Ideas about physical phenomena in spaceships among students and pupils. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 375-378
g6,P,M,AS

Ogunniyi, M.B. (1987). Conceptions of traditional cosmological ideas among literate and nonliterate Nigerians. Journal of Research in Science Teaching 24, 2, 107-117
g6,P,AS

Preece, P.F.M. (1985). Childrens' ideas about the earth and gravity. In: Preece, P.F.M., Clish, D.: The teaching of astronomy. Perspectives 16. Exeter: University of Exeter, school of Education, 67-73
g6,P,AS

Sadler, P.M. (1987). Misconceptions in astronomy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 422-425
g6,P,AS

Smith, C.L., Treagust, D.F. (1986). Learning and the acquisition of a knowledge structure for the discipline of astronomy. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 387-390
g6,P,AS

Smith, C.L., Treagust, D.F. (1988). Not understanding gravity limits students' comprehension of astronomy concepts. The Australian Science Teachers Journal 33, 4, 21-24
g6,P,AS,OCI

Sneider, C., Pulos, S. (1983). Children's cosmographies: Understanding the earth's shape and gravity. Science Education 67, 2, 205-221
g6,P,M,AS

Targan, D.S. (1987). A study of conceptual change in the content domain of the lunary phase. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 499-511
g6,g7,P,AS

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Treagust, D.F., Smith, C.L. (1986). Secondary students understanding of the solar system: implication for curriculum revision. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 363-368
g6,P,AS,OCI

Treagust, D.F., Smith, C.L. (1989). Secondary students' understanding of gravity and the motion of planets. School Science and Mathematics 89, 5, 380-391
g6,P,AS

Vicentini-Missoni, M. (1981). Earth and gravity: Comparison between adult's and children's knowledge. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 234-253
g6,P,AS

Viglietta, M.L. (1986). Earth, sky and motion. Some questions to identify pupils ideas. In: Hunt, J.J. (Ed.): GIREP conference 1986: Cosmos - an educational challenge. Proceedings of a conference held in Copenhagen, Denmark. Noordwijk, Netherlands: European Space Agency Publications Division, 369-370
g6,P,AS,OCI

Vosniadou, S. (1987). Children's acquisition and restructuring of science knowledge. Paper presented at the symposium "Children's procedural knowledge in science". AERA Annual Meeting, Washington D.C.,
g6,P,AS

Vosniadou, S., Brewer, W.F. (1987). Theories of knowledge restructuring in development. Review of Educational Research 57, 1, 51-67
g6,P,AS

Vosniadou, S., Brewer, W.F. (1989). Mental models of the earth: A study of conceptual change in childhood. University of Illinois: Center for the Study of Reading
g6,g7,P,AS,OCI

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik	**Area of physics**
EN - Energie	**- energy**

Arzi, H.J. (1988). On energy in chocolate and yogurt, or: on the applicability of school science concepts to real life. Paper presented at the annual meeting of the American Educational Research Association. New Orleans
g6,g8,P,EN,B,OCI

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1987). Individual development during teacher training. Research in Science Education 17, 182-191
g6,P,M,EN

Barbetta, M.G., Loria, A., Mascellani, V., Michelini, M. (1985). An investigation on students' frameworks about motion and the concepts of force and energy. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 219-226
g6,P,M,EN

Berge, O.E., Hauke, B. (1983). Schüler äußern sich über Energie. Naturwissenschaften im Unterricht - Physik/Chemie 31, 352-355
g6,P,M,EN

Bethge, T. (1988). Aspekte des Schülervorverständnisses zu grundlegenden Begriffen der Atomphysik - Eine empirische Untersuchung in der Sekundarstrufe II. Bremen: Universität Bremen
g1,g6,P,Q,AT,EN,CSC

Black, P., Solomon, J. (1983). Life world and science world: Pupils' ideas about energy. In: Marx, G.: Entropy in the school. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 43-55
g6,g7,P,EN,ENT

Bliss, J., Morrison, I., Ogborn, J. (1988). A longitudinal study of dynamics concept. International Journal of Science Education 10, 1, 99-110
g6,P,EN,M

Bliss, J., Ogborn, J. (1985). Children's choices of uses of energy. European Journal of Science Education 7, 195-203
g6,P,EN

Brook, A. (1985). Children's understanding of ideas about energy: A review of the literature. In: Driver, R., Millar, R.: Energy matters. Leeds: University of Leeds, Center for Studies in Science and Mathematics Education, 33-45
g6,P,EN

Brook, A., Driver, R. (1984). Aspects of secondary students' understanding of energy: Full report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,P,EN

Brook, A., Driver, R. (1984). Aspects of secondary students' understanding of energy: Summary report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,P,EN

Carr, M., Kirkwood, V., Newman, B., Birdwhistel, R. (1987). Energy in three New Zealand secondary school junior science classrooms. Research in Science Education 17, 117-128
g6,g7,P,EN,OCI

Dahncke, H. (1972). Teilaspekte der Energieerhaltung. Eine empirische Untersuchung einiger Voraussetzungen für Unterricht über das Prinzip von der Erhaltung der Energie bei 10 bis 15-jährigen Kindern. Kiel: Universtät Kiel
g6,P,M,EN

Dahncke, H., Duit, R., Niedderer, H. (1973). A hierarchy of concepts and principles, some types of learning and some results concerning the concept of energy for 5th graders in the IPN Curriculum Physik. In: Frey, K., Lang, M.: Kognitionspsychologie und naturwissenschaftlicher Unterricht. Bern: Huber, 341-365
g6,P,M,EN

Dahncke, H., Westphal, W. (1973). Methoden und Ergebnisse einer Untersuchung über Unterrichtsvoraussetzungen zum Prinzip von der Erhaltung der Energie. In: Schmidt, H.: Zur Didaktik der Physik und Chemie. Probleme und Perspektiven. Hannover: Schroedel, 105-116
g6,P,M,EN

de Bueger-Van der Borght, C., Mabille, A. (1989). The evolution in the meanings given by Belgian secondary school pupils to biological and chemical terms. International Journal of Science Education 11, 3, 347-362
g6,P,EN,C,B

Driver, R., Warrington, L. (1985). Students' use of the principle of energy conservation in problem situations. Physics Education 20, 171-176
g6,P,EN

Duit, R. (1980). Der Satz von der Erhaltung der Energie in der Sekundarstufe I ? Empirische Ergebnisse. In: DPG-Fachausschuß Didaktik der Physik: Vorträge auf der Frühjahrstagung 1980. Gießen: 1. Physikalisches Institut, 145-150
g6,P,EN

Duit, R. (1981). Students' notions about the energy concept - before and after physics instruction. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 268-319
g6,P,M,EN

Duit, R. (1981). Understanding energy as a conserved quantity - remarks on the article by R.U. Sexl. European Journal of Science Education 3, 291-301
g6,P,M,EN

Duit, R. (1983). Energy conceptions held by students and consequences for science teaching. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 316-321
g6,P,EN

Duit, R. (1983). Is the second law of thermodynamics easier to understand than the first law ? In: Marx, G.: Entropy in the school. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 87-97
g6,P,EN,ENT

Duit, R. (1984). Kraft, Arbeit, Leistung, Energie - Wörter der Alltagssprache und der physikalischen Fachsprache. physica didactica 11, 129-144
g4,g6,P,M,EN

Duit, R. (1985). Work, force and power - words in everyday language and terms in mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 227-233
g4,g6,P,M,EN

Duit, R. (1986). Energievorstellungen. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 7-9
g6,P,EN

Duit, R. (1986). Untersuchungen zum Erlernen des Energiebegriffs. In: Duit, R.: Der Energiebegriff im Physikunterricht. Kiel: IPN, 168-255
g6,P,EN

Duit, R., Zelewski, H.D. von (1979). Ohne Energie ist es düster in unserem Leben. Naturwissenschaften im Unterricht - Physik/Chemie 27, 161-164
g6,P,M,EN

Fedra, D. (1989). Schülervorstellungen zum Energieverbrauch und ihre Aufarbeitung im Physikunterricht der Sekundarstufe II. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 298-306
g6,P,T,EN,OCI

Gayford, C.G. (1986). Some aspects of the problems of teaching about energy in school biology. European Journal of Science Education 8, 4, 443-450
g6,P,EN

Genet, M.F., Gagliardi, R. (1986). Representation spontanee sur l'energie des eleves de 1ere (16-18 ans). In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 51-57
g6,P,EN

Gilbert, J., Pope, M. (1982). Schoolchildren discussing energy. Surrey: Institute of Educational Development/University of Surrey
g6,P,EN

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Granville, M.F. (1985). Student misconceptions in thermodynamics. Journal of Chemical Education 62, 10, 847-848
g6,P,T,EN,ENT

Ivowi, U.M.O., Oludotun, J.S. (1987). An investigation of sources of misconceptions in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 252-257
g6,P,M,EN

Jenelten-Allkofer, C., Duit, R. (1980). Entwicklung des Energiebegriffs bei 5- bis 16-jährigen. Naturwissenschaften im Unterricht - Physik/Chemie 12, 408-413
g6,P,M,EN

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (1.Teil). physica didactica 5, 3, 125-146
g1,g5,g6,P,M,EN,OCI

Jung, W. (1978). Zum Problem der "Schülervorstellungen" (2.Teil). physica didactica 5, 4, 231-248
g1,g5,g6,P,M,EN,OCI

Kesidou, S. (1990). Irreversibilitätsvorstellungen und Erhaltungsvorstellungen: Ergebnisse einer empirischen Untersuchung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 269-271
g6,P,IRR,EN

Kesidou, S. (1990). Schülervorstellungen zur Irreversibilität. Kiel: Universität Kiel, Mathematisch-Naturwissenschaftliche Fakultät
g3,g5,g6,P,T,EN,IRR,OCI

Kleinman, R.W., Griffin, H.C., Königsberg Kerner, N. (1987). Images in chemistry. Journal of Chemical Education 64, 9, 766-771
g6,P,EN,C

Koliopoulos, D., Tiberghien, A. (1986). Elements d'une bibliographie concernant l'enseignement de l'energie au niveau des colleges. ASTER. Recherches en didactique des sciences experimentales No 2/1986. Institut National de Recherche Pedagogique 29, Paris, 167-178
g6,P,EN

Kruger, C. (1990). Some primary teachers' ideas about energy. Physics Education 25, 86-91
g6,g8,P,EN,OCI

Lawson, R.A., McDermott, L.C. (n.d.). Student understanding of the work-energy and impulse-momentum theorem. Paper accepted by American Journal of Physics
g6,P,M,EN

Manthei, U., Täubert, P. (1981). Zustandsgröße und Prozeßgröße erläutert am Beispiel Energie - Arbeit, Wärme, Strahlung. Physik in der Schule 19, 7/8, 307-317
g6,P,M,T,EN

McClelland, J.A.G. (1970). An approach to the development and assessment of instruction in Science at second grade level. The concept of energy. Ithaca, N.Y.: Cornwell University
g6,P,M,EN

Piaget, J., De Lannoy, J. (1973). La formation de la notion de force. Kap. V: La transmission de l'energie entre deux pendules relies par un fil. Paris: Presses Universitaire
g6,P,M,EN

Rhöneck, C. von (1979). Lernschwierigkeiten beim Energieerhaltungssatz der Mechanik im Zusammenhang mit Reibungsphänomenen. physica didactica 6, 221-227
g6,P,M,EN

Rhöneck, C. von, Duit, R. (1978). Empirische Daten zur Entwicklung des Energiebegriffs. Der Physikunterricht 12, 2, 59-71
g6,P,EN

Schaefer, G. (n.d.). Empirical studies on concept formation. The concept of "Energy" and "Health" in West-German schools. Hamburg: University of Hamburg
g6,P,B,EN,STS

Schaefer, G. (1980). Der Beitrag des Biologieunterrichts zur Entwicklung eines Energiebewußtseins. Vortrag auf der MNU/SIL-Tagung "Weltproblem Energie" 9. - 11.3.1980 in Koblenz
g6,P,EN,STS,OCI

Schaefer, G. (1983). The concept triangle energy-information-order in the heads of our students. In: Marx, G.: Entropy in the school. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 56-86
g6,P,INF,EN

Schenk, B. (1982). Was verstehen Schüler der Sekundarstufe II unter dem Begriff Energie ? physica didactica 9, 61-70
g6,P,EN

Shultz, T.R., Coddington, M. (1981). Development of the concepts of energy conservation and entropy. Journal of Experimental Child Psychology 31, 131-153
g6,P,EN,ENT,IRR

Simpson, M., Arnold, B. (1982). Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 65-72
g6,P,EN,M,B

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Solomon, J. (n.d.). Background ideas about energy. London: Chelsea College, Centre for Science Education
g6,P,M,EN,OCI

Solomon, J. (1982). How children learn about energy or does the first law come first ? The School Science Review 63, 224, 415-422
g6,g7,P,M,EN,OCI

Solomon, J. (1983). Learning about energy: How pupils think in two domains. European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Solomon, J. (1984). Promts, cues and discrimination: the utilization of two seperate knowledge systems. European Journal of Science Education 6, 277-284
g1,g6,P,EN

Solomon, J. (1985). Teaching the conservation of energy. Physics Education 20, 165-170
g6,g7,P,EN

Stead, B. (1980). Energy. Learning in Science Project, Working Paper No.17. University of Waikato
g6,P,EN,OCI

Terpstra, K.J., van Sprang, H.F., Verdonk, A.H. (1989). "Hoe WARM het was en hoe ver...." - Op weg naar warmte als thermodynamisch begrip in 5-VWO ? Tijdschrift voor Didactiek der β-wetenschappen 7, 1, 3-26
g6,T,P,EN,OCI

Warren, J.W. (1982). The nature of energy. European Journal of Science Education 4, 3, 295-297
g6,P,EN

Watts, D.M. (1980). An exploration of student's understanding of the concepts "force" and "energy". Paper represented at the International Conference on Education for Physics Teaching, Trieste
g6,P,M,EN,OCI

Watts, D.M., Gilbert, J.K. (1983). Enigmas in school science: students' conceptions for scientifically associated words. Research in Science and Technological Education 1, 2, 161-171
g4,g6,P,M,EN,OCI

Watts, M. (1983). Some alternative views of energy. Physics Education 18, 213-217
g6,P,EN

Watts, M. (1983). Using networks to represent pupils' meanings for concepts of force and energy. In: Bliss, J., Monk, M., Ogborn, J.: Qualitative data analysis for educational research. Canberra: Croom Helm, 89-96
g6,P,M,EN,OCI

Welch, W.W. (1984). Learning about energy: A review of the literature. Science Education Research Unit, University of Waikato, Hamilton, N.Z.
g6,P,EN

Wheeler, A.E. (1983). Misconceptions in elementary science - A Kellyian perspective. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 304-309
g1,g6,P,EN

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

P - Bereich der Physik - Sonstige	Area of physics - others

Abdel-Wahab, M.C. (1978). Levels of understanding of new physics laws. Madison: University of Wisconsin
g6,P,Q

Aguirre, J., Erickson, G.L. (1984). Students' conceptions about the vector characteristics of three physics concepts. Journal of Research in Science Teaching 21, 5, 439-457
g6,P

Aiello-Nicosia, M.L., Sperandeo-Mineo, R.M. (1982). An experimental study of the relationship between formal thinking and physics achievment. Journal of Research in Science Education 4, 2, 203-211
g6,P

Bailey, J., Francis, R., Hill, D. (1987). Exploring ideas about magnets. Research in Science Education 17, 113-116
g6,P,MAG,OCI

Banholzer, A. (1936). Die Auffassung physikalischer Sachverhalte im Schulalter. Tübingen: Universität Tübingen
g6,P

Barrow, L.H. (1987). Magnet concepts and elemantary students' misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 17-22
g6,P,MAG

Barz, W., Riesch, W., Westphal, W. (1974). Interviews mit Schülern am Beispiel von Untersuchungen von Lernvoraussetzungen für Physikunterricht. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 66-71
g5,g6,P

Black, P., Nachtigall, D., Tiberghien, A., Lijnse, P.L., Vos, H. (1989). Working-Group 5: Educational research. In: Luchner, K., Deger, H., Dengler, R., Worg, R.: International Conference: Teaching modern Physics - Condensed Matter. Singapore/New Jersey/London/Hong Kong: World Scientific, 344-361
g6,P

Bormann, M. (1986). Das Schülerverständnis zu Elektronen. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1986 in Gießen. Gießen: DPG-Fachausschuß Didaktik der Physik, 227-232
g6,P

Bormann, M. (1987). Das Schülervorverständnis zum Themenbereich "Modellvorstellungen zu Licht und Elektronik". In: Kuhn, W. (Hrsg.): Didaktik der Physik. Vorträge der Physikertagung 1987 in Berlin. Gießen: DPG Fachausschuß Didaktik der Physik, 475-481
g6,P,Q

Brämer, R. (1980). Über die Wirksamkeit des Physikunterrichts. Naturwissenschaften im Unterricht - Physik/Chemie 28, 1, 10-17
g6,P

Daumenlang, K. (1969). Physikalische Konzepte junger Erwachsener. Ihre Abhängigkeit von Schule und Familienkonstellation. Nürnberg: Universität Nürnberg
g6,P

Duit, R. (1981). Students' notions (preconceptions) and the learning of physics concepts. Diwang Pisika 2, 1, 2-9
g6,P

Duit, R. (1989). Vorstellungen vom Magnetismus. Naturwissenschaften im Unterricht - Physik/Chemie 37, 4-5
g6,P,MAG

Eijkelhof, H.M.C., Klaassen, C.W.J.M., Lijnse, P. (1987). Public and pupil's ideas about radiation: some lessons from Chernobyl to science educators. In: Riquarts, K.: Science and technology education and the quaility of life. Kiel: IPN-Materialien, 688-693
g6,P

Engelhardt, P., Wiesner, H. (1989). Kenntnisse und Vorstellungen von Schülern und Studenten zur Quantenphysik. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 231-236
g6,P,OCI

Erickson, G.L., Aguirre, J. (1985). Students' intuitions and science instructions: Stability and task context in students' thinking about vector quantities. Paper presented at the Annual Meeting of the Canadian Society for the Study of Education, Montreal, 28
g6,P

Genin, C., Pellet, A., Michaud-Bonnet, J. (1987). Structuration mathematique des representations des eleves scientifiques a propos des grandeurs physiques vectorielle. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 112-116
g6,g7,P

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Göritz, J., Wiesner, H. (1984). Wie verstehen Schüler Probleme der Quantenphysik ? Praxis der Naturwissenschaften Physik 83, 3, 90-92
g6,P,Q

Haupt, G.W. (1952). Concepts of magnetism held by elementary school children. Science Education 36, 162-168
g6,P,MAG

Helm, H. (1980). Misconceptions in physics amongst South African students. Physics Education 15, 92-97, 105
g6,P

Hewson, P.W. (1982). A case study of conceptual change in special relativity: The influence of prior knowledge in learning. European Journal of Research in Science Education 4, 1, 61-78
g6,P,R

Hilbert, M. (1953). Untersuchungen zur Physik des Schulkindes. Westermanns Pädagogische Beiträge 8, 19-28
g6,P

Ivowi, U.M.O. (1983). Misconceptions in physics amongst Nigerian secondary school students. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 356-361
g6,P

Ivowi, U.M.O. (1984). Misconceptions in physics amongst Nigerian Secondary School students. Physics Education 19, 279-285
g6,P

Klaassen, C.W.J.M., Eijkelhof, H.M.C., Lijnse, P.L., Scholte, R.L.J. (1988). Leerlingen over Tsjernobyl. Tijdschrift voor Didactiek der β-wetenschappen 6, 3, 199-219
g6,P,STS

Konold, C.E. (1983). Informal conceptions of probability. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 163-193
g6,P,STAT

Lichtfeldt, M. (1988). Physikalisches Verständnis für die Quantenmechanik in der gymnasialen Oberstufe. In: Wiebel, K.: Zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 364-366
g6,P,Q

Lichtfeldt, M. (1988/89). Schülervorstellungen in der Quantenphysik. Brennpunkt Lehrerbildung. Berlin: Freie Universität Berlin, 18-20
g6,P,Q

Lichtfeldt, M. (1989). Änderungen von Schülervorstellungen durch Quantenphysikunterricht in der gymnasialen Oberstufe. In: Wiebel, K.: Zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 234-236
g6,P,Q

Lichtfeldt, M. (1989). Evaluation eines Unterrichtsentwurfes zur Einführung in die Quantenphysik. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 394-400
g6,g7,P,Q

Lichtfeldt, M. (1990). Schülervorstellungen und Quantenphysik - ein unüberwindbares Hindernis für den Unterrricht ? In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 299-301
g6,P,Q

Lijnse, P.L., Eijkelhof, H.M.C., Klaasen, C.W.J.M., Scholte, R.L.J. (1990). Pupils' and mass-media ideas about radioactivity. International Journal of Science Education 12, 1, 67-78
g6,P,OCI

Linder, C.J. (1987). Tertiary physics : a case study in students' conceptions of sound. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 322-334
g6,P,S

Linder, C.J. (1990). Is conceptual change something science teachers should be striving for ? Paper presented to the XVIII annual conference of the Canadian Society for the Study of Education, Victoria
g1,g5,g6,P,S

Linke, R.D., Venz, M.I. (1979). Misconceptions in physical science among nonscience background students. Research in Science Education 9, 103-109
g6,P

Lybeck, L. (1979). Some real pictures from the classroom-based research in physics teaching at Göteborg. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds
g6,P

Machold, A. (1982). Schülervorstellungen vor und während des Unterrichts in spezieller Relativitätstheorie. physica didactica 9, 175-189
g6,P,R

Malony, D.P. (1984). Cognitive physics educational research - a bibliography. Creighton, Omaha: University of Craighton, Physics Department
g1,g6,g7,P

Manthei, U. (1966). Empirische Untersuchungen zum Denken 12- bis 13-jähriger Schüler bei der Lösung physikalischer Probleme. Physik in der Schule 4, 61-65, 115-119
g6,P

Manthei, U. (1966). Raumvorstellungen und Raumbegriffe im Physikunterricht der Klasse 6. Physik in der Schule 4, 429-432, 443-446
g6,P

Manthei, U. (1967). Eine Studie zur Begriffsbildung im Physikunterricht. Physik in der Schule 5, 111-118, 247-252
g6,P

Manthei, U. (1967). Über das naive Erklären physikalischer Sachverhalte durch 12- bis 13-jährige Schüler. Physik in der Schule 5, 431-436, 491-494
g6,P

McDermott, L.C., Rosenquist, M., Popp, R., Zee, E. van (1983). Identifying and overcoming student conceptional difficulties in physics. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g6,P

Niedderer, H. (1989). Qualitative and quantitative methods of investigating alternative frameworks of students - With results from atomic physics and other subject areas. Paper presented to the annual meeting of the American Association of Physics Teachers. American Association for the Advancement of Science
g5,g6,P,Q,CSC

Nielsen, H., Thomsen, P.V. (1983). Gymnasie Fysik. Rapport nr.1. Hverdagsforestillinger om Fysik. Aarhus: Aarhus Universitet, Det fysiske Institut
g6,P

Nussbaum, J. (1979). The effect of the SCIS's "relativity" unit at the child's conception of space. Journal of Research in Science Teaching 16, 45-51
g6,P

Pella, M.O., Voelker, A.M. (1967/68). Teaching the concepts of physical and chemical change to Elementary School children. Journal of Research in Science Teaching 5, 311-323
g6,C,P

Pfuhl Rodrigues, D.M.A. von (1980). Notions of physical laws in childhood. Science Education 64, 1, 59-84
g6,P,OCI

Piaget, J. (1973). Die Entwicklung des Erkennens II. Das physikalische Denken. Stuttgart: Klett
g1,g6,P

Proverbio, E., Lai, S. (1989). Spontaeous models and the formalization of the concepts of weather and time at the elementary school level. International Journal of Science Education 11, 1, 113-123
g5,g6,P

Robertson, W.W., Richardson, E. (1975). The development of some physical science concepts in Secondary School students. Journal of Research in Science Teaching 12, 319-325
g6,P

Ronen, M., Ganiel, U. (1988). From assumption of knowledge to knowledgeable considerations: a class activity on "ionizing radiation and its biological effects". International Journal of Science Education 10, 5, 523-529
g6,P,STS

Schaefer, G. (1984). Information und Ordnung - zwei mächtige Begriffe unserer Zeit. In: Schaefer, G.: Information und Ordnung. Köln: Aulis, 9-45
g6,P,INF,STAT,ENT

Schaefer, G., Joppien, S., Plickat, A. (1986). Teachers' and students' reaction to and concept of a computer in West-Germany. Paper presented to the international seminar "The Use of Computers in Biology Education", Helsinki, Finland, Report published in 1987 through IUBS

g6,P,GEN

Schenk, B. (1982). Lernerbiografien Physik. physica didactica 9, 249-255

g6,P

Smith, C., Carey, S., Wiser, M. (1985). On differentiation: A case study of the development of the concepts of size, weight and density. Cognition 21, 3, 177-237

g6,P

Spreckelsen, K. (1986). Schülervorstellungen im Grundschulalter. In: Bleichroth, W.: Aufsätze zur Didaktik der Physik. physica didactica 13: Sonderheft, 103-108

g1,g6,P

Stavridou, H., Solomonidou, C. (1989). Physical phenomena - chemical phenomena: do pupils make a distinction ? International Journal of Science Education 11, 1, 83-92

g6,P,IRR,C,OCI

Viennot, L. (1981). The implication of mathematical structure versus physical content: Report on a research done by S. Fauconnet. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 79-91

g6,P

Viennot, L. (1983). Implicit statements in physics: Students and constants. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 355-361

g6,P

Viennot, L. (1983). Implicit statements in physics: Students and constants. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 133-137

g6,P

Villani, A., Pacca, J.L.A. (1987). Students' spontaneous ideas about the speed of light. International Journal of Science Education 9, 1, 55-66

g6,P,R

Voelker, A.M. (1975). Elementary School children's attainment of the concepts of physical and chemical change. A replication. Journal of Research in Science Teaching 12, 5-14

g6,C,P

Weerda, J. (1978). Begriffe der Chemie und Physik in der Sprache der Kinder und der Wissenschaften. Frankfurt/Main, Bern: Lang

g6,C,P

Zee, E.van, McDermott, L. (1987). Investigation of student difficulties with graphical representations in physics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 531-539

g6,P

Zietz, K. (1938). Das physikalische und technische Denken des Kindes. Bayerische Lehrerzeitung 12, 180-184

g6,g8,P,OCI

Zietz, K. (1938). Physikalische Theorien bei Kindern. Die Deutsche Schule 42, 205-210

g6,P

g6,P,others

Zietz, K. (1955). Kind und physische Welt. München
g6,P

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

C - Bereich der Chemie Area of chemistry

Anamuah-Mensah, J. (1987). Preliminary investigations into students' representations of the state of chemical equilibrium. Chemistry and Industry 1, 2, 113-117
g6,C

Anamuah-Mensah, J. (1988). Polarisation of chemical knowledge: Are there two cultures - theory and practicals. Running Head: Polarisation of Chemical Knowledge, Dept. of Science Education, University of Cape Coast, Ghana
g6,C

Andersson, B. (1990). Pupils' conceptions of matter and its transformations (age 12-16). Studies in Science Education 18, 53-85
g6,g7,P,AT,C

Andersson, B.R. (1984). Chemical reactions. Möndal: University of Gothenburg, Department of Education and Educational Research
g6,C

Andersson, B.R. (1986). Pupils explanations of some aspects of chemical reactions. Science Education 70, 5, 549-563
g6,C

Andersson, B.R., Renström, L. (1982). How Swedish pupils, age 12-15, explain the "Phosporus" problem. Leeds-Göteborg Study: Pupils' content oriented reasoning in science. Mölndal: University of Gothenburg, Department of Education and Educational Research
g6,C

Andersson, B.R., Renström, L. (1982). Oxidation of steel wool. Mölndal: University of Gothenburg, Department of Education and Educational Research
g6,C

Arzi, H.J. (1985). The long-term kinetics of conceptual development: The case of + = - and contextual differentation. Research in Science Education 15, 112-121
g6,C

Bargellini, A., Riani, P., Berni, T., Innocenti, E.D., Gallo, M., Manghesi, L., Morelli, M. (1988). Communication et activite experimentale au niveau de l`ecole primaire. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. , 267-271
g6,C

Barke, H.D. (1982). Die neue Konstante k(TAP)- die Arbeit eines Schülers. Praxis der Naturwissenschaften - Chemie 31, 306-308
g6,C

Barke, H.D. (1982). Probleme bei der Verwendung von Symbolen im Chemieunterricht. Eine empirische Untersuchung an Schülern der Sekundarstufe I. Naturwissenschaften im Unterricht - Physik/Chemie 30, 4, 131-133
g6,C

Barke, H.D. (1982). Schülerversuche mit Strukturmodellen. Empirische Untersuchungen zum praktischen Einsatz von Modellen bei der Einführung von chemischen Symbolen. Der Chemieunterricht 13, 4, 4-21
g6,C

Ben-Zvi, R., Eylon, B.-S., Silberstein, J. (1987). Students' visualisation of a chemical reaction. Education in Chemistry 24, 4, 117-120
g6,C,OIM

Biddulph, F., Osborne, R. (1983). Learning in Science Project (Primary): Children's ideas about metals. Working Paper (No.112) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g6,C,OCI

BouJaoude, S.B. (1990). The relationship between students' learning strategies and the change in their chemical misunderstandings during a High School Chemistry Course. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g6,C

Bouma, H., Brandt, L., Sumfleth, E. (1988). Wörter als Werkzeuge im naturwissenschaftlichen Unterricht - Die Namen einiger chemischer Elemente. Naturwissenschaften im Unterricht - Physik/Chemie 36, 38-41
g6,C

Buck, P. (1986). Vorstellungen hinter dem Begriff "Stoff". Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 38-42
g6,C

Buell, R.R., Bradley, G. (1972). Piagetian studies in science: Chemical equilibrium understanding from study of solubility: A preliminary report from secondary school chemistry. Science Education 56, 1, 23-29
g6,C

Buthig, W. (1976). Schülerkenntnisse über Stoffe der Natur. Untersuchung über die Anfänge der Chemie im Weltbild Zehnjähriger. Sachunterricht und Mathematik in der Grundschule 4, 526-531
g6,C

Butts, B., Smith, R. (1987). HSC chemistry students' understanding of the structure and properties of molecular and ionic compounds. Research in Science Education 17, 192-201
g5,g6,C,OIM,OCI

Cachapuz, A.F.C., Martins, I.P. (1987). High school students' ideas about energy of chemical reactions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 60-68
g6,C,EN

Cachapuz, A.F.C., Maskill, R. (1987). Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. International Journal of Science Education 9, 4, 491-504
g5,g6,g7,C,P,T

Cachapuz, A.F.C., Maskill, R. (1989). Using word association in formative classroom tests: following the learning of Le Chatelier's principle. International Journal of Science Education 11, 2, 235-246
g5,g6,C

Carr, M., Oxenham, J. (1984). Model confusion in science. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton: Science Education Research Unit, University of Waikato, 81-88
g3,g6,C

Cervellati, R., Montuschi, A., Perugini, D., Grimellini-Tomasini, N., Pecori Balandi, B. (1982). Investigation of secondary school students' understanding of the mole concept in Italy. Journal of Chemical Education 59, 10, 852-856
g6,C

Cervellati, R., Perugini, D. (1981). The understanding of the atomic orbital concept by Italian High School students. Journal of Chemical Education 58, 7, 568-569
g6,C

Champagne, A.B., Halbwachs, F., Meheut, M. (1983). Representations and their role in learning in the fields of mechanics and transformations of matter. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 629-634
g6,C,P,M,AT

Cros, D., Chastrette, M., Fayol, M. (1988). Conceptions of second year university students of some fundamental notions in chemistry. International Journal of Science Education 10, 3, 331-336
g6,P,AT,C

Cros, D., Maurin, M. (1986). Conceptions of first-year university students of the constituents of matter and the notions of acids and bases. European Journal of Science Education 8, 3, 305-313
g6,P,AT,C

de Bueger-Van der Borght, C., Mabille, A. (1989). The evolution in the meanings given by Belgian secondary school pupils to biological and chemical terms. International Journal of Science Education 11, 3, 347-362
g6,P,EN,C,B

Driver, R. (1985). Beyond appearence: The conservation of matter under physical and chemical transformations. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 145-169
g6,P,M,AT,C

Duncan, I.M., Johnstone, A.H. (1979). The mole concept. Education in Chemistry 10, 6, 213-214
g6,C

Ellerton, N.F., Ellerton, H.D. (1987). Mathematics and chemical problems created by students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 131-136
g5,g6,C,CSC

Ewing, A.M. (1931). A preliminary study on the difficulty of certain chemistry topics. School Science and Mathematics 31, 7, 872-873
g6,C

Eylon, B.-S., Ben-Zwi, R., Silberstein, J. (1982). Student conception of structure and process in chemistry, part I and II. In: White, A., Blosser, P.,: NARST annual meeting, abstracts of papers. Columbus: ERIC/CLNGHE SCI., MATH.,& ENVIRON.,ED.
g6,C

Feldsine, J.E. (1987). Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 177-181
g6,g7,P,C,M

Fensham, P.J. (1987). Describtion and frameworks of solution and reactions in solutions. Research in Science Education 17, 139-148
g6,C

Fladt, R. (1981). Ehrenwerte Irrtümer von Schülern - und was wir daraus lernen könnten! Der Chemieunterricht 12, 1, 67-71
g6,C

Frey, K., Pfundt, H., Lehrke, M., Bayrhuber, H., Jenelten-Allkofer, C. (1982). Nutzung psychologischer Methoden und Erkenntnisse bei der Vorbereitung naturwissenschaftlicher Curricula. Kiel: IPN
g1,g5,g6,C

Fritsch, L., Ehlert, M. (1990). Vorstellungen der Schüler vom Bau der Stoffe. Chemie in der Schule 37, 4, 118-127
g6,P,AT,C

Furio Mas, C.J., Hernandez, J. (1987). Parallels between adolescents' conception of gases and the history of chemistry. Journal of Chemical Education 64, 7, 616-618
g3,g6,P,M,C

Garnett, P.J., Treagust, D.F. (1990). Implications of research on students' understanding of electrochemistry for improving science curricula and classroom practice. International Journal of Science Education 12, 2, 147-156
g6,g7,C,OCI

Garnett, P.J., Treagust, D.F. (1989). Difficulties experienced by Senior High School chemistry students of electrochemistry: Electric circuits and oxidation-reduction equations. Paper presented at the annual meeting of the National Association for Research in Science Teaching
g6,P,E,C,OCI

Gennaro, E.D. (1981). Assessing Junior High Students' understanding of density and solubility. School Science and Mathematics 81, 399-404
g6,C,P,M

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Gloriozov, P.A. (1962). Knowledge about substances and phenomena of pupils taking chemistry in the 7th grade. Soviet Education 4, 11, 50-56
g6,C

Gorodetsky, M., Gussarsky, E. (1986). Misconceptualization of the chemical equilibrium concept as revealed by different evaluation methods. European Journal of Science Education 8, 4, 427-441
g5,g6,C

Gorodetsky, M., Hoz, R. (1985). Changes in the group cognitive structure of some chemical equilibrium concepts following a university course in general chemistry. Science Education 69, 185-199
g6,C

Gorodetzky, M., Gussarsky, E. (1987). The role of students and teachers in misconceptualisation of aspects in chemical equilibrium. In: Novak, J.: "Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 187-193
g6,g8,C

Grützmann, F. (1980). Die Vorstellung von "Teilchen versus Kontinuum" und "Erhaltung" bei Schülern des 7. bis 9. Jahrgangs zu Versuchen mit Verdunsten, Kondensieren, Lösen, Kristallisieren. Kiel: Universität Kiel
g6,C,P,AT

Gussarsky, E.; Gorodetsky, M. (1988). On the chemical equilibrium concept: Constrained word associations and conceptions. Journal of Research in Science Teaching 25, 5, 319-333
g5,g6,C

Hackling, M.W., Garnett, P.J. (1985). Chemical equilibrium: Learning difficulties and teaching strategies. The Australian Science Teachers Journal 31, 4, 8-13
g6,C

Hackling, M.W., Garnett, P.J. (1985). Misconceptions of chemical equilibrium. European Journal of Science Education 7, 205-214
g6,C

Haidar, A.H., Abraham, M.R. (1989). A comparison of applied and theoretical knowledge of concepts based on the particulare nature of matter. University of Oklahoma: Department of Chemistry and Biochemistry
g6,P,AT,C

Hall, J.R. (1973). Conservation concepts in elementary chemistry. Journal of Research in Science Teaching 10, 143-146
g6,C

Hänsel, H. (1989). Auffassungen und innere Modelle der Schüler vom Bau der Stoffe als Grundlage für eine differenzierte Führung im Chemieanfangsunterricht. Rostock: Universität Rostock
g6,C,P,AT

Haupt, P. (1979). Lernvorgänge bei der Begriffsbildung im Chemieunterricht. Dargestellt am Beispiel: Verbrennung - Oxidation. In: Härtel, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 55-57
g6,C

Haupt, P. (1980). Probleme des Auffassungsvermögens bei der Begriffsbildung im Chemieunterricht - dargestellt am Beispiel Verbrennung - Oxidation. Oldenburg: Universität Oldenburg
g6,C

Haupt, P. (1981). Schülervorstellungen zur Verbrennung. Naturwissenschaften im Unterricht - Physik/Chemie 29, 347-350
g6,C

Haupt, P. (1984). Verbrennungs- und Oxidationsvorgänge im Verständnis von Schülern. Köln: Aulis
g6,C

Haupt, P. (n.d.). Die chemische Verbindung aus der Sicht der Schüler. Ergebnisse einer empirischen Untersuchung (unveröffentlicht)
g6,C

Herron, J.D. (1975). Piaget for chemists. Journal of Chemical Education 52, 146-150
g6,C

Hesse, J.J., Anderson, C.W. (n.d.). Students' conceptions of chemical change. Journal of Research in Science Teaching, in press
g6,C,CSC,OCI

Holding, B. (1985). Aspects of secondary students' understanding of elementary ideas in chemistry: Summary report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,C

Holding, B. (1987). Investigation of schoolchildren's understanding of the process of dissolving with special reference to the conservation of matter and the development of atomistic ideas. Leeds: The University of Leeds, School of Education
g1,g3,g6,P,AT,C

Johnstone, A.H., McDonald, J.J., Webb, G. (1977). Misconceptions in school thermodynamics. Physics Education 12, 4, 248-251
g6,C,P,T

Kaup-Hartog, G. (1990). Hexa-Cyano-Verrat. Vorstellungen zur chemischen Fachsprache. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 175-177
g4,g6,C

Kempa, R.F., Hodgson, G.H. (1976). Levels of concept acquisition and concept maturation in students of chemistry. British Journal of Educational Psychology 46, 253-260
g6,C

Kleinman, R.W., Griffin, H.C., Königsberg Kerner, N. (1987). Images in chemistry. Journal of Chemical Education 64, 9, 766-771
g6,P,EN,C

Klemmer, G., Reichwein, A. (1977). Zum emotional-affektiven Aspekt von Chemieunterricht. Vorstudie. chimica didactica 3, 117-128
g6,C

Kugbey, H.G.K., Anamuah-Mensah, J. (1987). Misconceptions of Ghanaian sixth form science students about chemical equilibrium. Chemistry and Industry 1, 2, 123-126
g6,C

Lee, K.W. (1985). Cognitive variables in problem solving in chemistry. Research in Science Education 15, 43-50
g6,C

Llorens Molina, J., Llopis Castello, R. (1988). Langage quotidien et acquisition des concepts scientifiques. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 107-115
g4,g6,C,OIM

Lybeck, L., Marton, F., Strömdahl, H., Tullberg, A. (1986). The phenomenography of the "mole concept". An example of how the study of students' understanding can contribute to the advancement of science and science education. In: Ramsden, P.: Improving learning: new perspectives. London: Kogan Page
g6,C

Lybeck, L., Strömdahl, H., Tullberg, A. (n.d.). En kemididaktisk studie av N-eleves uppgattningar av storheten substansmängd och dess sI-enhet 1 mol. Göteborg: Göteborg Universitet, Institutionen för Pedagogik
g6,C

Lybeck, L., Strömdahl, H., Tullberg, A. (1985). Students' conceptions of amount of substance and its SI unit 1 mol. Gothenburg: Gothenburg University
g6,C

Lybeck, L., Strömdahl, H., Tullberg, A. (1988). A research approach to science and mathematics education developed at Göteborg: Some methodological issues in studies of students' and educators' conceptions of certain strategically chosen concepts. In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 38-108
g5,g6,P,M,C,OCI

Maskill, R., Cachapuz, A.F.C. (1989). Learning about the chemistry topic of equilibrium: The use of word association tests to detect developing conceptualizations. International Journal of Science Education 11, 1, 57-69
g5,g6,C

Meheut, M., Saltiel, E., Tiberghien, A. (1985). Pupils' (11-12 year olds) conceptions of combustion. European Journal of Science Education 7, 1, 83-93
g6,C,OCI

Mein, M.-T., Clement, P. (1988). Comment se represente-T-on aujourd'hui notre cerveau ? In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Diexiemes Journees Internationales sur l'Education Scientifique. , 243-252
g6,C

Mitchell, I., Gunstone, R. (1984). Some student conceptions brought to the study of stoichiometry. Research in Science Education 14, 78-88
g6,P,AT,C,OCI

Münzinger, W. (1989). "Wenn Blei enstanden ist, dann ist es Reduktion von Bleioxid". chimica didactica 15, 5-25
g5,g6,C,GEN

Nay, U. (1973). Schulkindliche Deutungen von chemischen Versuchen als Grundlage der sequentiellen Plazierung von Lernzielen. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 104-108
g6,C

Nay, U. (1978). Entwicklungspsychologische Parameter bei der Erprobung des Nuffield-Projekts. Der mathematische und naturwissenschaftliche Unterricht 31, 483-489
g6,C

Nay, U. (1990). Beispiele für Alltagsvorstellungen, die das naturwissenschaftliche Denken behindern. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 275-277
g6,C

Nay, U., Glatzel, D. (1978). Schulkindliche Identifizierung von Säuren und Laugen. Sachunterricht und Mathematik in der Primarstufe 6, 244-249
g6,C

Novick, S., Menis, J. (1976). A study of student perceptions of the mole concept. Journal of Chemical Education 53, 720-722
g6,C,OCI

Osborne, R., Schollum, B. (1983). Coping in chemistry. The Australian Science Teachers Journal 29, 1, 13-24
g6,g7,P,AT,C,OCI

Padiglione, C., Torracca, E. (1990). Logical processes in experimental contexts and chemistry teaching. International Journal of Science Education 12, 2, 187-194
g6,C

Pella, M.O., Voelker, A.M. (1967/68). Teaching the concepts of physical and chemical change to Elementary School children. Journal of Research in Science Teaching 5, 311-323
g6,C,P

Peterson, R.F., Treagust, D.F. (1988). Students' understanding of covalent bonding and structure concepts. The Australian Science Teachers Journal 33, 4, 77-81
g6,C

Peterson, R.F., Treagust, D.F. (1989). Grade-12 students' misconceptions of covalent bonding and structure. Journal of Chemical Education 66, 6, 459-460
g6,C

Peterson, R.F., Treagust, D.F., Garnett, P. (1986). Identifications of secondary students' misconceptions of covalent bonding and structure concepts using a diagnostic instrument. Research in Science Education 16, 40-48
g6,C

Peterson, R.F., Treagust, D.F., Garnett, P.J. (1989). Development and application of a diagnostic instrument to evaluate grade-11 and grade-12 students' concepts of covalent bonding and structure following a course of instruction. Journal of Research in Science Teaching 26, 4, 301-314
g4,g5,g6,C

Pfundt, H. (1981). Pre-instructional conceptions about substances and transformations of substances. In: Jung, W., Pfundt, H., Rhöneck, C. von: Proceedings of the international workshop on "Problems Concerning Students' Representation of Physics and Chemistry Knowledge". Ludwigsburg: Pädagogische Hochschule, 320-341

g6,C

Pfundt, H. (1982). Vorunterrichtliche Vorstellungen von stofflicher Veränderung. chimica didactica 8, 161-180

g6,C,OCI

Prieto, T., Blanco, A., Rodriguez, A. (1989). The ideas of 11 to 14-year-old students about the nature of solutions. International Journal of Science Education 11, 4, 451-463

g6,P,AT,C,OIM

Rennström. L. (1987). Pupils conceptions of matter. A phenomenographic approach. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 400-414

g5,g6,P,C,AT

Ringnes, V. (1987). Misconceptions in environmental chemistry among Norwegian students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 415-421

g6,C,STS

Ross, B.H.B. (1989). High school students' concepts of acids and bases. Paper presented at the annual meeting of the Canadian Society of Studies in Education, Quebec City

g6,C

Scharf, V., Brinkmann, H., Overkamp, M. (1982). Rückgewinnung von Stoffen. Ein Schlüsselprozeß für den Unterricht, dargestellt an einer Modellreaktion. Naturwissenschaften im Unterricht - Physik/Chemie 30, 6, 219-223

g6,C,STS,OCI

Schmidt, H.J. (1983). Schüler auf dem Wege zum Verständnis von chemischen Formeln und Gleichungen. Der mathematische und naturwissenschaftliche Unterricht 36, 417-424

g6,C

Schmidt, H.J. (1987). Secondary school students' learning difficulties in stoichiometry. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 396-404

g6,C

Schmidt, H.J. (1989). A study of students' alternative frameworks in stoichiometry. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 303-311

g6,C

Schmidt, H.J. (1990). On the instability of misconceptions: How students form their concept of isomerism. Paper presented at the 63th Annual Meeting of the Natinal Association for Research in Science Teaching, Atlanta, Georgia

g6,C,OCI

Schollum, B. (1982). Chemical change. New Zealand Science Teacher 33, 4-9

g6,C

Schollum, B., Happs, J.C. (1982). Learner's views about burning. The Australian Science Teachers Journal 28, 3, 84-88

g6,P,AT,C

Sebald, D., Häusler, K. (1987). Was wissen Schüler der Primarstufe von Säuren ? Naturwissenschaften im Unterricht - Physik/Chemie 35, 290

g6,C

Selley, N.J. (1973). An examination of the understanding of certain chemical concepts by pupils preparing for G.C.E. advanced level. London: King's College
g6,C

Sequeira, M., Freitas, M. (1987). Children's alternative conceptions about "mold" and "copper oxide". In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 413-423
g6,C,B

Stavridou, H., Solomonidou, C. (1989). Physical phenomena - chemical phenomena: do pupils make a distinction ? International Journal of Science Education 11, 1, 83-92
g6,P,IRR,C,OCI

Stavy, R., Stachel, D. (1984). Children's ideas about solid and liquid. Tel-Aviv: Tel-Aviv University, Israeli Science Teaching Center, School of Education
g6,C

Stavy, R., Stachel, D. (1985). Children's conception of changes in the state of matter: From solid to liquid. Archives de Psychologie 53
g6,C

Stewart, A.R. (1928). A study of difficulties in chemistry. School Science and Mathematics 28, 8, 838-848
g6,C

Stückrath, F. (1953). Die Anfänge der Chemie im Weltbild des Kindes. Westermanns Pädagogische Beiträge 5, 403-410
g6,C,OCI

Sumfleth, E. (1985). Zur Problematik der quantitativen Auswertung von erweiterten Paar-Beziehungs-Tests. chimica didactica 11, 197-216
g6,C,OCI,CTL

Sumfleth, E. (1988). Knowledge of terms and problem-solving in chemistry. International Journal of Science Education 10, 1, 45-60
g6,C

Sumfleth, E. (1988). Lehr- und Lernprozesse im Chemieunterricht. Frankfurt: Lang
g1,g5,g6,C

Sumfleth, E. (1990). Das Vorwissen der Schüler - eine wesentliche Variable in Problemlöseprozessen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 89-111
g1,g6,C

Sumfleth, E., Todtenhaupt, S. (1988). Zum Redox-Verständnis der Schüler beim Übergang von der Sekundarstufe I zur Sekundarstufe II. chimica didactica 14, 43-68
g6,C,OCI

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Treagust, D.F. (1988). Development and use of diagnostic tests to evaluate students' misconceptions in science. International Journal of Science Education 10, 2, 159-169
g5,g6,B,C

Van Driel, J., De Vos, W., Verdonk, A.H. (1989). Chemisches Gleichgewicht - Eine empirisch-didaktische Untersuchung. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 195-197
g3,g6,C,OCI

Van Driel, J., De Vos, W., Verdonk, A.H. (1989). Leopold Pfaundler, Michael, Karin und das chemische Gleichgewicht. Über eine Beziehung zwischen Chemieunterricht und Geschichte der Chemie. chimica didactica 15, 185-204
g3,g6,C

Voelker, A.M. (1975). Elementary School children's attainment of the concepts of physical and chemical change. A replication. Journal of Research in Science Teaching 12, 5-14
g6,C,P

Voorde, H.H. ten (1979). Level raise in chemistry education. Paper represented at the "Cognitive Development-Research Seminar, Science and Mathematics Education", Leeds
g6,C

Weerda, J. (1978). Begriffe der Chemie und Physik in der Sprache der Kinder und der Wissenschaften. Frankfurt/Main, Bern: Lang
g6,C,P

Weerda, J. (1982). Untersuchungen zum Modellbegriff in der Chemie: eine empirische untersuchung bei Schülern. Frankfurt/Main, Bern: Lang
g6,C

Wells, J. (1972). Some aspects of adolescent thinking in science. Educational Review 24, 3, 212-224
g6,P,M,C,OCI

Wheeler, A.E., Kass, H. (1978). Student misconceptions in chemical equilibrium. Science Education 62, 2, 223-232
g6,C

Yarroch, W.L. (1985). Student understanding of chemical equation balancing. Journal of Research in Science Teaching 22, 5, 449-459
g6,C,OIM,OCI

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

B - Bereich der Biologie Area of biology

Adeniyi, E.O. (1985). Misconceptions of selected ecological concepts held by some Nigerian students. Journal of Biological Education 19, 4, 311-316
g6,B

Albaladejo, C., Lucas, A.M. (1988). Pupils' meanings for "mutation". Journal of Biological Education 22, 3, 215-219
g6,B

Ameh, C.O., Gunstone, R.F. (1985). Teachers' concepts in science. Research in Science Education 15, 151-157
g6,g8,P,M,E,B

Ameh, C.O., Gunstone, R.F. (1986). Science teachers' concepts in Nigeria and Australia. Research in Science Education 16, 73-81
g6,g8,P,E,M,B

Amir, R., Frankl, D.R., Tamir, P. (1987). Justification of answers to multiple choice items as a means for identifying misconceptions. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 15-25
g5,g6,B

Amir, R., Tamir, P. (1989). When does a factor become a "limiting factor" ? - a study of students' misconceptions. Journal of Biological Education 23, 2, 129-134
g6,B,OCI

Amir, R., Tamir, P. (1990). Detailed analysis of misconceptions as a basic for developing remedial instruction: The case of photosynthesis. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,B,OCI

Anderson, C.W., Smith, E.L. (1984). Children's preconceptions and content-area textbooks. In: Duffy, G., Roehler, L.R., Mason, J.: Comprehension instruction: Perspectives and suggestions. New York: Longman, 187-201
g6,g7,P,O,B

Angus, J.W. (1981). Children's conceptions of the living world. Australien Science Teacher's Journal 27, 3, 65-68
g6,B

Arnaudin, M.W., Mintzes, J.J. (1985). Students' alternative conceptions of the human circulatory system: A cross age study. Science Education 69, 721-733
g6,B

Arnaudin, M.W., Mintzes, J.J. (1986). The cardiovascular system: Children's conceptions and misconceptions. Science and Children 23, 5, 48-51
g6,B

Arzi, H.J. (1988). On energy in chocolate and yogurt, or: on the applicability of school science concepts to real life. Paper presented at the annual meeting of the American Educational Research Association. New Orleans
g6,g8,P,EN,B,OCI

Askham, L.R. (1976). The effects of plants on classification behavior in an outdoor environment. Journal of Research in Science Teaching 13, 1, 49-54
g6,B

Barker, M. (1986). The description and modification of children's views of plant nutrition. University of Waikato
g6,B

Barker, M., Carr, M. (1989). Teaching and learning about photosynthesis. Part 2: A generative learning strategy. International Journal of Science Education 11, 2, 141-152
g6,B,OCI

Barras, R. (1984). Some misconceptions and misunderstandings perpetuated by teachers and textbooks of biology. Journal of Biological Education 18, 201-206
g6,B

Baydoun, E., Hernandez, D., Schaefer, G., Styrz, I., Wille, J. (1987). The concept of health: Free association tests. In: Kelly, P.J., Lewis, J.L. (Ed.): Education and health. Oxford: Pergamon Press, 27-34
g6,B

Bell, B. (1981). When an animal is not an animal. Journal of Biological Education 15, 3, 213-218
g6,B

Bell, B. (1985). Students' ideas about plant nutrition: What are they ? Journal of Biological Education 19, 3, 213-218
g6,B

Bell, B., Barker, M. (1982). Towards a scientific concept of "animal". Journal of Biological Education 16, 3, 197-200
g6,g7,B

Bell, B., Brook, A. (1984). Aspects of secondary students' understanding of plant nutrition: Summary report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,B

Bell, B., Brook, A. (1984). Aspects of secondary students' understanding of plant nutrition: Full report. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,B

Bernstein, A.C., Cowan, P.A. (1975). Children's concepts of how people get babies. Child Development 46, 77-91
g6,B

Berzonsky, M.D., Ondrako, M.A., Williams, G.T. (1977). Modifications of the life concept in reflective and impulsive children. Journal of Genetic Psychology 130, 11-17
g6,B

Biddulph, F. (1984). Learning in Science Project (Primary): Pupils' ideas about flowering plants. Working Paper (No.125) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g6,B

Billeh, V.Y., Pella, M.O. (1972). Cultural bias in the attainment of concepts of the biological cell by elementary school children. Journal of Research in Science Teaching 7, 2, 73-83
g6,B

Billeh, V.Y., Pella, M.O. (1972). Relationships between mental maturity, ability level and level of understanding of three categories of science concepts. Science Education 56, 1, 5-16
g6,B

Bishop, B.A., Anderson, C.W. (1985). Students conceptions of natural selection and its role in evolution. Paper presented at the annual conference of NARST, Indiana
g6,B

Bloom, J.W. (1989). Contexts of meaning: Young children's understanding of biological phenomena. Paper presented at the annual meeting of the Canadian Society for Studies in Education, Quebec City
g1,g6,B

Blum, L.H. (1977). Health information via mass media: study of the individual's concepts of the body and its parts. Psychological Reports 40, 3, 991-999
g6,B

Bowd, A.D. (1983). Children's fears of animals. Journal of Genetic Psychology 142, 313-314
g6,B

Bowd, A.D. (1984). Fears and understanding of animals in middle childhood. Journal of Genetic Psychology 145, 143-144
g6,B

Browning, M.E., Lehmann, J.D. (1988). Identification of student misconceptions in genetics problem solving via computer programs. Journal of Research in Science Teaching 25, 9, 747-761
g5,g6,B

Brumby, M.N. (1979). Problems in learning the concept of natural selection. Journal of Biological Education 13, 4
g6,B

Brumby, M.N. (1981). Learning, understanding and "thinking about" the concept of life. The Australian Science Teachers Journal 27, 3, 21-25
g6,B,OCI

Brumby, M.N. (1982). Student's perceptions of the concept of life. Science Education 66, 4, 613-622
g6,B

Brumby, M.N. (1984). Misconceptions about the concept of natural selection by medical biology students. Science Education 68, 493-503
g6,B

Brumby, M.N., Garrard, J., Auman, J. (1985). Student's perception of the concept of health. European Journal of Science Education 7, 307-323
g6,B

Calafate, L.C. (1986). Paradigmes cognitifs dans la salle de classe a propos de l'idee d'adaptation et de didactique des sciences. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 83-94
g6,B

Caral, P., Rastilla, C. (1986). Une etude sur le niveau de structuration des concepts "Photosynthese" et "respiration" des studiants de l'ecole normale. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 39-44
g6,B

Caravita, S., Tonucci, F. (1987). How children know biological structure-function-relationships. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 65-73
g6,B

Caravita, S., Tonucci, F., Consoli, V., Rusca, G. (1988). Investigating pupils' conceptualization in the biological domain: structure-function relationsships. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2. Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 1-19
g6,B

Cho, H.H., Kahle, J.B., Nordland,F.H. (1985). An investigation of High School biology textbooks as sources of misconceptions and difficulties in genetics and some suggestions for teaching genetics. Science Education 69, 707-719
g6,g7,B

Clamann, Y.H., Janke, D.L. (1976). Mastery levels of three important biology concepts by Junior High School students. Paper presented at the Annual Meeting of the AERA, San Francisco
g6,B

Collins, A. (1987). A description of the strategic knowledge of experts solving transmission genetics problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 76-90
g6,B

Conn, J.H. (1947). Children's awareness of the origins of babies. Journal of Child Psychiatry, 1, 140-176
g6,B

Conn, J.H., Kanner, L. (1947). Children's awareness of sex differences. Journal of Child Psychiatry, 1, 3-57
g6,B

Contento, I. (1981). Children's thinking about food and eating - A piagetian-based study. Journal of Nutrition Education 13, 1, 86-90
g6,B

Davidson, D. (1981). Children's concepts of the human body: a study of cognitive development. Unpublished doctoral thesis, United States International University
g6,B

de Bueger-Van der Borght, C., Mabille, A. (1989). The evolution in the meanings given by Belgian Secondary School pupils to biological and chemical terms. International Journal of Science Education 11, 3, 347-362
g6,P,EN,C,B

Deadman, J.A., Kelly, P.J. (1978). What do secondary schoolboys understand about evolution an heredity before they are taught the topics ? Journal of Biological Education 12, 1, 7-15
g6,B

Deneby, J.A. (1978). A study of school-aged children's knowledge of five body organs. Unpublished doctoral thesis, University of Iowa
g6,B

Dolgin, K.G., Behrend, D.A. (1984). Children's knowledge about animates and inanimates. Child Development 55, 1646-1650
g6,B

Dreyfus, A. (1988). Communiquer des notions abstraites: Intentiones et realites. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. , 91-97
g6,B

Dreyfus, A., Jungwirth, E. (1987). The pupil and the living cell: a taxonomy of dysfunctional ideas about an abstract idea. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 91-96
g6,B

Dreyfus, A., Jungwirth, E. (1988). The cell concept of 10th graders: curricular expectations and reality. International Journal of Science Education 10, 2, 221-229
g6,B

Dreyfus, A., Jungwirth, E. (1989). The pupil and the living cell: a taxonomy of dysfunctional ideas about an abstract idea. Journal of Biological Education 23, 1, 49-55
g1,g6,B,OCI

Eaton, J.F., Anderson, C.W., Smith, E.L. (1983). When students don't know they don't know. Science and Children 20, 7, 7-9
g6,P,O,B

Eisen, Y., Stavy, R. (1988). Students' understanding of photosynthesis. The American Biology Teacher 50, 4, 208-212
g6,B

Engel Clough, E., Driver, R. (1986). A study of consistency in the use of students' conceptual frameworks across different task contexts. Science Education 70, 4, 24
g6,P,M,T,B

Engel Clough, E., Driver, R. (1987). How do children's scientific ideas change over time ? School Science Review, 255-267
g6,P,B,T,M

Engel Clough, E., Wood-Robinson, C. (1985). Children's understanding of inheritance. Journal of Biological Education 19, 4, 304-310
g6,B,OCI

Engel Clough, E., Wood-Robinson, C. (1985). How secondary students interpret instances of biological adaptation. Journal of Biological Education 19, 2, 125-130
g6,B,OCI

Engström, Y. (1981). The laws of nature and the origin of life in pupil's conciousness: a study of contradictory modes of thought. Scandinavian Journal of Educational Research 25, 2, 39-61
g6,B

Evans, J.D. (1978). Putting names to concepts in biology. Journal of Biological Education 12, 4, 261-266
g6,B

Fallon, A.E., Rozin, P., Pliner, P. (1984). The child's conception of food: the development of food rejections with special reference to digust and contamination sensitivity. Child Development 55, 566-575
g6,B

Fisher, K.M. (1983). Amino acids and translation: A misonception in biology. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 407-419
g6,B

Fisher, K.M. (1985). A misconception in biology: amino acids and translation. Journal of Research in Science Teaching 21, 53-62
g6,B

Fisher, K.M. et al. (1984). Student misconceptions and teacher assumptions in college biology. Paper presented at the American Association for the Advancement of Science Annual Meeting, New York
g6,B

Gagliardi, R., Mosconi Bernadini, P., Bocciola, M.T., Strubsberg, S., Simeone, R., Simeone, S. (1988). Nous ne sommes pas des petits ballons les modeles spontanes des eleves de l'ecole italienne sur la cellule. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 209-213
g6,B

Gartley, W., Bernasconi, M. (1967). The concept of death in children. Journal of Genetic Psychology 110, 71-85
g6,B

Gellert, E. (1962). Children's conceptions of the content and functions of the human body. Genetic Psychology Monographs 65, 293-405
g6,B,OCI,OIM

Gelman, R. (1983). What preschoolers know about animate and inanimate objects. In: Rogers, D., Sloboda, J.A.: The acquisition of symbolic skills. New York: Plenum Press, 297-324
g6,B,OCI

George, J., Glasgow, J. (1988). Patterns in Caribbean science-related cultural beliefs which may affect learning in school science. Paper presented at the CARIERA/UWI/Bristol Conference, St. Lucia, West Indies
g4,g6,B

George, J., Glasgow, J. (1989). Some cultural implications of teaching towards common syllabi in science: a case study from the Caribbean. School Science Review 70, 254, 115-123
g4,g6,B

Gilbert, J.K., Watts, M. (1983). Concepts, misconceptions and alternative conceptions: Changing perspectives in science education. Studies in Science Education 10, 61-98
g1,g6,P,E,EN,O,AT,T,C,B

Gillespie, J.P. (1972). A study of concept development and communication abilities in young children using variations in leaf morphology. Journal of Research in Science Teaching 9, 1, 57-64
g6,B

Giordan, A. (1983). Les representations des eleves: outils pour la pedagogie. Cahiers Pedagogiques 214, 26-28
g1,g6,B

Giordan, A. (1984). Learning process (and obstacles thereto) of science pupils aged 6-14. Council of Europe, Council for cultural co-operation, Educational research workshop on science in primary education. Edinburgh
g6,g7,B

Giordan, A. (1985). Des representations des eleves a l'appropriation de quelques concepts scientifiques. In: Giordan, A.: Reconstruire ses savoir. Paris: Messidor, 113-127
g1,g6,B

Giordan, A. (1987). Premodeles et modeles (personells et historiques) a propos du champ conceptuel de respiration. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 143-149
g1,g3,g6,B

Giordan, A., Martinand, J.L. (1988). Etat des recherches sur les conceptions des apprenants a propos de la biologie (1). In: Giordan, A., Mathieu, J.L., Viovy, R.: Annales de didactique des sciences (no.2). Rouen: Universite de Rouen, 11-63
g1,g5,g6,B

Giordan, A., Nguyen-Lin, M., De Vecchi, G., Raichvarg, D. (1986). Categories of conceptions about sexuality and some of their didactical consequences. Laboratoire de didactique et epistemologie de science (LDES), University of Geneva, Switzerland
g6,B

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Goldman, R.J., Goldman, J.D. (1982). How children perceive the origin of babies and the roles of mothers and fathers in procreation: A cross-national study. Child Development 53, 491-504
g6,B

Graf, D. (1989). Anwendung der Mapping-Methode zur Begriffsvermittlung und Begriffsüberprüfung am Beispiel einer Unterrichtseinheit "Ernährung und Verdauung" für die Klassen 5 und 6. Der mathematisch-naturwissenschaftliche Unterricht 42, 7, 427-432
g5,g6,B

Graham, I. (1983). Difficulties encountered by biology students in understanding and applying the mole concept. Journal of Biological Education 17, 4, 339-342
g6,B

Griffiths, A.K., Grant, B.A. (1985). High school student's understanding of food webs: identification of a learning hierarchy and related misconceptions. Journal of Research in Science Teaching 22, 5, 421-426
g6,B

Griffiths, K.M. (1977). An investigation into the development of concepts of animism in selected primary school children. Birmingham: University of Birmingham
g6,B

Hackling, M.W. (1982). An examination of secondary student's understanding of inheritance concepts. Australian Science Teachers Journal 28, 1, 13-20
g6,B

Hackling, M.W., Treagust, D.F. (1984). Research data necessary for meaningful review of grade ten High School genetics curricula. Journal of Research in Science Teaching 21, 197-209
g6,B

Halliden, O. (1988). The evolution of the species - pupil perspectives and school perspectives. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2.Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN, 21-55
g6,B

Hallden, O. (1988). The evolution of the species: pupil perspectives and school perspectives. International Journal of Science Education 10, 5, 541-552
g6,B

Haney, R.E (1965). The development of a non-verbal test of children's concepts of animals. Journal of Research in Science Teaching 3, 3, 198-203
g5,g6,B

Happs, J.C. (1981). Soils - Some aspects of student understanding of soil. A working paper of the Science Education Research Unit, University of Waikato, NZ
g6,B,OCI

Happs, J.C. (1984). Soil genesis and development: Views held by New Zealand students. The Journal of Geography, 177-180
g6,B

Happs, J.C., Scherpenzeel, L. (1987). Achieving long term conceptual change using the learners prior knowledge and a novel teaching setting. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 172-181
g6,g7,B

Hedewig, R. (1988). Naturvorstellungen von Schülern - Ergebnis einer Befragung von Schülern der Jahrgangsstufen 3 bis 10 unterschiedlicher Schulformen. In: Hedewig, R., Stichmann, W. (Hrsg.): Biologieunterricht und Ethik. Köln: Aulis, 212-229
g6,B,OCI

Hickman, F.M., Kennedy, M.H., McInerny, J.D. (1978). Human genetics education: results of BSCS needs assessment surveys. American Biology Teacher 40, 5, 285-303
g6,B

Hildebrand, A.C. (1985). Conceptual difficulties associated with understanding genetics: a review of the literature on genetics learning. Unpublished Manuscript, 1-21
g6,B

Hoz, R., Tomer, Y., Bowman, D., Chayoth, R. (1987). The use of concept mapping to diagnose misconceptions in biology and earth sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 245-256
g5,g6,B

Jahoda, G. (1958). Child animism I: a critical survey of cross cultural research. Journal of Social Psychology 47, 197-212
g6,B

Jimenez Aleixandre, M.P., Fernandez Perez, J. (1987). Selection or adjustment ? Explanations of university biology students for natural selection problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 224-238
g6,B,GEN

Johnson, C.N., Hendrick, K. (1984). Body partonomy: how children partition the human body. Developmental Psychology 20, 5, 967-974
g6,B

Johnstone, A.H., Mahmoud, N.A. (1980). Pupils' problems with water potential. Journal of Biological Education 14, 4, 325-328
g6,B

Jungwirth, E. (1971). A comparison of the acquisition of taxonomic concepts by BSCS and BSCS pupils. Australian Science Teachers Journal 17, 4, 80-82
g6,B

Jungwirth, E. (1975). "Preconceived adaption and inverted evolution" - A case of distorted concept-formation in High School biology. The Australian Science Teachers Journal 21, 2, 95-100
g6,B

Jungwirth, E. (1988). The associate field as a diagnostic instrument in assessing the breadth of multi-contextual concepts: the concept "development". International Journal of Science Education 10, 5, 571-579
g5,g6,g8,B

Kane, B. (1979). Children's concepts of death. Journal of Genetic Psychology 134, 141-153
g6,B

Kargbo, D.B., Hobbs, E.D., Erickson, G.L. (1980). Children's beliefs about inherited characteristics. Journal of Biological Education 14, 2, 137-146
g6,B

Kinnear, J.. (1983). Identification of misconceptions in genetics and the use of computer simulations in their correction. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 84-92
g6,g7,B

Kinnear, J.F., Martin, M.D. (1987). Symbol use and concept development in genetic engeneering. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 246-259
g6,B

Knaggs, J. (1989). What do children think about "Growth" ? Primary Science Review 9, 1, 26-28
g6,B,OCI

Kreitler, H., Kreitler, S. (1966). Children's concepts of sexuality and birth. Child Development 37, 363-378
g6,B

Lawson, A.E. (1988). The acquisition of biological knowledge during childhood: cognitive conflict or Tabula Rasa ? Journal of Research in Science Teaching 25, 3, 185-199
g1,g6,P

Lawson, A.E., Thompson, L.D. (1988). Formal reasoning ability and misconceptions concerning genetics and natural selection. Journal of Research in Science Teaching 25, 9, 733-746
g6,B

Lazarowitz, R. (1981). Correlations of junior high school students' age, gender and intelligence with ability to construct classification in biology. Journal of Research in Science Teaching 18, 1, 15-22
g6,B,GEN

Lazarowitz, R., Meir, O. (1988). High school students' questions in biology: Cognitive levels and content themes. Research in Science Education 18, 9-21
g6,B,GEN

Leeds, M.J. (1986). Mental models of learners about energy metabolism. Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, San Francisco
g6,B

Longden, B. (1982). Genetics - are there inherent learning difficulties ? Journal of Biological Education 16, 135-140
g6,B

Looft, W.R. (1973). Animistic thought in children: effect of two response modes. Perceptual and Motor Skills 36, 59-62
g6,B

Looft, W.R. (1974). Animistic thought in children: understanding living across its associated attributes. Journal of Genetic Psychology 124, 235-240
g6,B

Looft, W.R., Charles, D.C. (1964). Modification of the life concept in children. Develomental Psychology 1, 4, 445
g6,B

Marek, E.A. (1986). They misunderstand, but they'll pass. The Science Teacher, Dec., 32-35
g6,B

Marek, E.A. (1986). Understandings and misunderstandings of biology concepts. American Biology Teacher 48, 1, 37-40
g6,B

Martin, F.L. (1979). The development of an instrument for determining botanically related misconceptins of beginning college botany students. Unpublished doctoral thesis, University of Southern Mississippi
g6,B

Maurer, A. (1970). Maturation of concepts of live. Journal of Genetic Psychology 116, 101-111
g6,B

Mendez de Gagliardi, M., Canay de Mendez, A.M., Gagliardi, R. (1986). L'insuline est nescessaire pour diminuer le sang epais ! In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 209-213
g6,B

Merkle, D.G., Treagust, D.F. (1987). Secondary school students' locus of control and conceptual knowledge related to health and fitness. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 325-337
g6,B

Mintzes, J.J. (1984). Naive theories in biology: Children's concepts of the human body. School Science and Mathematics 84, 7, 548-555
g6,B

Mintzes, J.J., Arnaudin, M.W. (n d.). Children's biology: A review of research on conceptual developement in the life sciences. Department of Biological Sciences, University of North Carolina at Wilmington
g6,B

Mintzes, J.J., Trowbridge, J.E. (1987). Alternative frameworks in animal classification. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 338-347
g6,B

Moore, J.E., Kendall, D.C. (1971). Children's concepts of reproduction. Journal of Sex Research 7, 42-61
g6,B

Murray, D., Bowbal, D. (1987). Constructing a conceptual framework for solving a problem. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 348-359
g6,B

Murray, D.L. (1983). Misconceptions of osmosis. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 428-433
g6,B,P,M

Nagy, M.H. (1948). The child's theories concerning death. The Journal of Genetic Psychology 73, 3-27
g5,g6,B,OCI,OIM

Nagy, M.H. (1953). Children's birth theories. Journal of Genetic Psychology 83, 217-226
g6,B

Nagy, M.H. (1953). Children's conceptions of some bodily functions. Journal of Genetic Psychology 83, 199-216
g6,B

Nagy, M.H. (1953). The representation of "germs" by children. Journal of Genetic Psychology 83, 227-240
g6,B

Noce, G., Strusberg, S. (1986). Les conceptions sur la reproduction et l'heredite: une stude chez des eleves d'une ecole romaine. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 193-199
g6,B

Noel, D. (1988). De l'util...a la necessite des representations. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Diexiemes Journees Internationales sur l'Education Scientifique, 227-233
g6,B

Okeke, E.A.C., Wood-Robinson, C. (1980). A study of Nigerian pupils' understanding of selected biological concepts. Journal of Biological Education 14, 4, 329-338
g6,B

Porter, C.S. (1974). Grade school children's perceptions of their internal body parts. Nursing Research 23, 5, 384-381
g6,B

Prout, A. (1985). Science, health and everyday knowledge: A case study about the common cold. European Journal of Science Education 7, 399-406
g6,B

Quiggin, V. (1977). Children's knowledge of their internal body parts. Nursing Times 73, 30, 1146-1151
g6,B

Rice, P., Gunstone, R.F. (1986). Health and sickness causation and the influence of Thai culture among Thai schoolchildren. Research in Science Education 16, 63-72
g6,B,STS,OCI,GEN

Riechard, D.E. (1973). Life-science concept development among beginning kindergarten children from three different communities. Journal of Research in Science Teaching 10, 1, 39-50
g6,B

Roth, K.J., Smith, E.L., Anderson, C.W. (1983). Student's conceptions of photosynthesis and food for plants. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g6,B

Rozin, P., Fallon, A., Augustoni, M. (1985). The child's conception of food: the development of contamination sensitivity to "disgusting" substances. Developmental Psychology 21, 6, 1075-1079
g6,B

Rui de Vilar Correia, M. (n.d.). Concepcoes dos alunos sobre mecanismos de regulacao da permeabilidade a agua em celulas animais e vegetais. Minho: Universidade do Minho. Unidade Cintifico Pedagogica de Educacao
g6,B

Russel-Gebett, J. (1984). Pupil's preconceptions of three dimensional structures in biology lessons. Journal of Biological Education 18, 3, 220-225
g6,B

Russel-Gebett, J. (1985). Skills and strategies: pupil's approaches to three dimonsional problems in biology. Journal of Biological Education 19, 4, 293-298
g6,B

Russell, R.W., Dennis, W. (1941). Note concerning the procedure employed in investigating child anismism. Journal of Genetic Psychology 58, 423-424
g6,B

Russell-Gebbett, J. (1984). Pupils' perceptions of three-dimensional structures in biology lessons. Journal of Biological Education 18, 3, 220-225
g6,B,OIM,ORC

Ryman, D. (1974). Childrens' understanding of the classification of living organisms. Journal of Biological Education 8, 3, 140-144
g6,B

Safier, G. (1964). A study in relationship between life and death concepts in children. Journal of Genetic psychology 105, 283-294
g6,B

Sanford, J.P., Schmidt French, B. (1986). Teaching and learning genetics: A case studies of academic work in two classrooms. Paper presented at the annual meeting of the American Education Research Association, San Francisco
g6,g7,B

Schaefer, G. (n.d.). Empirical studies on concept formation. The concept of "Energy" and "Health" in West-German schools. Hamburg: University of Hamburg
g6,P,B,EN,STS

Schaefer, G. (1979). Concept formation in biology: The concept "Growth". European Journal of Science Education 1, 1, 87-101
g6,B,OCI

Schaefer, G. (1980). The concept of "Health" and "Environment" in future biology teaching. Proceedings of the Eights Biennial Conference of AABE
g6,B,STS

Schaefer, G. (1983). Der Begriff Ökosystem in den Köpfen von Schülern und Lehrern. Verhandlungen der Gesellschaft für Ökologie. Band XI, 351-359
g6,g8,B

Schaefer, G. (1987). Der Biologie-Lehrer als Gesundheitserzieher. Bremen: Verband Deutscher Biologen
g6,B

Schaefer, G. (1990). Gesundheit - Vorstellungen in verschiedenen Kulturen. Gesundheit. Friedrich Jahresheft VIII, 8, 10-13
g6,B

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C. (1987). Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 390-403
g6,g7,g8,B

Schilder, P., Wechsler, D. (1935). What do children know about the interior parts of the body ? International Journal of Psychoanalysis 16, 355-360
g6,B

Sequeira, M., Freitas, M. (1987). Children's alternative conceptions about "mold" and "copper oxide". In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 413-423
g6,C,B

Simpson, M., Arnold, B. (1982). Educational psychology and the teaching of specialist subjects. Scottish Educational Review 14, 2, 109-117
g6,g7,B

Simpson, M., Arnold, B. (1982). Availability of prerequisite concepts for learning biology at certificate level. Journal of Biological Education 16, 1, 65-72
g6,P,EN,M,B

Simpson, M., Arnold, B. (1983). Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 36-42
g1,g6,g7,B

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Simpson, M., Arnold, B. (1986). Readings on learning difficulties in Secondary School science - reprints from ACE biology newsletter. Aberdeen: Aberdeen College of Education
g6,g7,B

Simpson, M., Arnolds, B. (1982). The inappropriate use of subsumers in biology learning. European Journal of Science Education 4, 2, 173-182
g6,B

Simpson, W.D., Marek, E.A. (1988). Understandings and miscocnceptions of biology concepts held by students attending small high schools and students attending large high schools. Journal of Research in Science Teaching 25, 5, 361-374
g6,B

Slack, S.J., Streibel, M., Collins, A. (1987). A description of student problem solving performance on realistic genetics problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 452-460
g6,B

Smeets, P.M. (1974). The influence of MA and CA on the attribution of life and life traits to animate and inanimate objects. Journal of Genetic Psychology 124, 17-27
g6,B

Smith, M.U. (1990). Cell Division: Student misconceptions and instructional implications. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Boston MA
g6,B

Springer, K., Keil, F.C. (1989). On the development og biologically specific beliefs: The case of inheritance. Child Development 60, 637-648
g6,B

Stavy, R. (1987). How students aged 13-15 understand photosynthesis. International Journal of Science Education 9, 1, 105-115
g6,B

Stavy, R., Wax, N. (1989). Children's conceptions of plants as living things. Human Development 32, 635
g6,B

Stead, B. (1980). Animal. Working Paper No.22, University of Waikato, Learning in Science Project, 1-24
g6,B

Stead, B. (1980). Living. Working Paper No.15, University of Waikato, Learning in Science Project, 1-22
g6,B

Stead, B. (1980). Plants. Working Paper No.24, University of Waikato, Learning in Science Project, 1-19
g6,B

Stepans, J., Dyche, S. (1987). Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 466-480
g6,g7,P,M,B

Stewart, J., Hafner, B., Dale, M. (1990). Students' alternative views of meiosis. The American Biology Teacher 52, 4, 228-232
g6,B

Stewart, J.H. (1982). Difficulties experienced by High School students when learning basic mendelian genetics. The American Biology Teacher 44, 2, 80-82
g6,B,OCI

Stilwell, S., Brody, M. (1987). Cross cultural analysis of student understanding of marine science and natural resource concepts related to the gulf of Maine. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 490-498
g6,B,STS

Subbarini, M.S. (1983). Misconception about evolution among Secondary School pupils in Kuwait. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 434-440
g6,B

Symington, D.J., Boundy, K., Radford, T., Taylor, R. (1986). Prior knowledge and primary pupils' interaction with a museum display. Research in Science Education 16, 55-62
g6,B

Symington, D.J., White, R.T. (1983). Children's explanation of natural phenomena. Research in Science Education 13, 73-81
g6,B

Tait, C.D., Asher, R.C. (1955). Inside-of-the-body test: a preliminary report. Psychosomatic Medicine 17, 2, 139-148
g6,B

Tamir, P. (1989). Some issues related to the use of justifications to multiple-choice answers. Journal of Biological Education 23, 4, 285-292
g5,g6,B

Tamir, P. (n.d.). Some issues related to the use of justifications to multiple choice answers. Paper of the School of Education and Israel Science Teaching Center, Hebrew University, Jerusalem
g5,g6,B

Tamir, P., Gal-Choppin, R., Nussionovitz, R. (1974). Plant identification: a worthwhile aspect of achievment in biology. Australian Science Teachers Journal 18, 4, 62-66
g6,B

Tamir, P., Gal-Choppin, R., Nussionovitz, R. (1981). How do intermediate and Junior High School students conceptualize living and nonliving ? Journal of Research in Science Teaching 18, 3, 241-248
g6,B

Tamir, P., Zohar, A. (1991, in press). Anthropomorphism and teleology in reasoning about biological phenomena. Science Education
g6,B

Tema, B.O. (1989). Rural and urban African pupils' alternative conceptions of "animal". Journal of Biological Education 23, 3, 199-207
g6,B,OCI

Tolman, R.R. (1982). Difficulties in genetics problem solving. The American Biology Teacher 44, 9, 525-527
g6,B

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Treagust, D.F. (1988). Development and use of diagnostic tests to evaluate students' misconceptions in science. International Journal of Science Education 10, 2, 159-169
g5,g6,B,C

Treagust, D.F., Haslam, F. (1986). Evaluating secondary student's misconceptions of photosynthesis and respiration in plants using a two-tier diagnostic instrument. Paper presented at the 59th Annual Meeting of the National Association for Research in Science Teaching, San Francisco, California
g6,B

Trowbrigde, J.E., Mintzes, J.J. (1988). Alternative conceptions in animal classification: A cross-age study. Journal of Research in Science Teaching 25, 7, 547-571
g6,B

Von Hug-Hellmuth, H. (1964). The child's concept of death. Psychanalytic Quarterly 34, 499-516
g6,B

Wandersee, J.H. (1983). Students' misconceptions about photosynthesis: A cross-age study. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 441-466
g6,B

Wandersee, J.H. (1985). Can the history of science help science educators anticipate students' misconceptions ? Journal of Research in Science Teaching 23, 7, 581-597
g3,g6,B

Wandersee, J.H. (1986). Plants or animals: which do Junior High School students prefer to study ? Journal of Research in Science Teaching 23, 5, 415-426
g6,B

Wandersee, J.H., Mintzes, J.J. (1987). Children's biology: a content analysis of conceptual development in the life sciences. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 523-534
[illegible]5,B

Wellman, H.M., Johnson, C.N. (1982). Children's understanding of food and its functions: A preliminary study of the development of concepts of nutrition. Journal of Applied Developmental Psychology 3, 135-148
g6,B

White, E., Elsom, B., Prawat, R. (1978). Children's conceptions of death. Child Development 49, 307-310
g6,B

g6 UNTERSUCHUNGEN ZU VORSTELLUNGEN
INVESTIGATIONS OF NOTIONS

Sonstige others

Abdullah, K.B., Lowell, W.E. (1981). The ability of children to generalize selected science concepts. Journal of Research in Science Teaching 18, 6, 547-555
g6

Aikenhead, G.S. (1987). High School graduates beliefs about science-technology-society. III. Characteristics and limitations of scientific knowledge. Science Education 71, 4, 459-487
g6,STS,GEN

Allin, A.C., Rochel, J.-J., Clivaz, P., Gagliardi, R., Martin, Ch., Rossel, J.-D. (1988). Quels savoirs pour quelles pratiques de soins: Enseignement de la fonction endocrine a des eleves infirmiers, 1er semestre de formation. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles, 579-587
g6

Ameh, C.O. (1986). Common sense answers in physics. Research in Science Education 16, 31-39
g6,g8

Anderson, R.D. (1965). Children's ability to formulate mental models to explain natural phenomena. Journal of Research in Science Teaching 3, 326-332
g6

Andersson, B.R. (1976). Science teaching and the development of thinking: Development of concrete operational thinking and of language resulting from the SCIS/LMN special concepts unit "Relativity of position and motion". Mölndal, Sweden: University of Gothenburg
g6

Andersson, B.R. (1980). Pupils' thinking and course requirements in science teaching (EKNA). Newsletter, School Research 1
g6

Andersson, B.R., Renström, L. (1982). How Swedish pupils, age 12-15, explain the "exhaust"-problem. Leeds-Göteborg Study. Pupils' content oriented reasoning in science. Working Paper 2, presented at the EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6

Andersson, B.R., Renström, L. (1982). How Swedish pupils, age 12-15, explain the "Aspirin"-Problem. Leeds-Göteborg Study. Pupils' content oriented reasoning in science. Working Paper No.3, presented at the EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6

Andersson, B.R., Renström, L. (1982). How Swedish pupils, age 12-15, explain "The Sugar in Water"-Problem. Leeds-Göteborg Study. Pupils' content oriented reasoning in science. Working Paper No.1, presented at the EKNA-project 1982. Department of Education and Educational Research, University of Gothenburg. Mölndal
g6

Baird, J.R., Mitchell, I.J. (1986). Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery
g1,g6,g8,g9,CTL

Barbieri, G., Mosconi Bernardini P., Gagliardi, R. (1988). Les presentations en ecologie: Un moyen pour aborder l'interdisciplinarite dans l'education a l'enviroment. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles, 279-285
g6,sts

Benson, G.D. (1987). Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 59-66
g1,g6,g8,CSC

Bezzi, A. (1989). Geology and Society: a survey on pupils' ideas as an instance of a broader prospect for educational research in Earth Science. Paper presented at the 28th International Geological Congress held in Washington D.C.
g6,GEN

Bleichroth, W. (1957). Zur Entwicklung des physikalischen Denkens im Volksschulalter. Zeitschrift für Naturlehre und Naturkunde 5, 234-239
g6

Bliss, J. (1978). Ideas of chance and probability in children and adolescents. Physics Education 13, 408-413
g6,STAT,IRR

Born, G., Weber, R. (1976). Umgangssprachliche Verwendung physikalischer Begriffe. In: DPG-Fachausschuß Didaktik der Physik: Vorträge auf der Jahrestagung 1976. Gießen: I. Physikalisches Institut, 280-288
g4,g6

Boyd, C.A. (1966). A study of unfounded beliefs. Science Education 50, 396-398
g6

Brody, M.J. (1987). A programmatic approach to teaching and learning about students understanding of science and natural resource concepts related to environmental issues. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 67-80
g6,g7,STS

Brody, M.J. (1990). Fourth, eighth and eleventh grade students' understanding of pollution. Paper presented at the annual meeting of the National Association of Research in Science Teaching, Atlanta
g6,STS

Carter, C., Bodner, G. (1987). How students' conceptions of the nature of chemistry and mathematics influence problem solving. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics,Vol.III. Ithaca: Cornell University, 69-83
g6,CTL,CSC

Cauzinille-Marmeche, E., Meheut, M., Sere, M.G., Weil-Barais, A. (1985). The influence of a priori ideas on the experimental approach. Science Education 69, 201-211
g6

Clement, J. (1978). The role of analogy in scientific thinking: Examples from a problem-solving interview. Amherst: University of Massachusetts, Department of Physics and Astronomy
g6

Cohen, M.R., Kagan, M.H. (1979). Where does the old moon go ? The Science Teacher 46, 8, 22-23
g6

Dahlgren, L.O., Marton, F. (1978). Student conceptions of subject matter. Studies in Higher Education 3, 7, 25-35
g6

Deluca, F.P. (1979). Application and analysis of an electronic equivalent of Piaget's first chemical experiment. Journal of Research in Science Teaching 16, 1-11
g6

Dennis, W. (1957). Animistic thinking among College and High School Students in the near east. Journal of Educational Psychology 48, 193-198
g6

Doran, R.L. (1972). Misconceptions of selected science concepts. Journal of Research in Science Teaching 9, 127-137
g6

Driver, R. (1981). Pupils' alternative frameworks in science. European Journal of Science Education 3, 1, 93-101
g1,g6

Driver, R., Easley, J. (1978). Pupils and paradigms: A review of literature related to concept development in adolescent science students. Studies in Science Education 5, 61-84
g1,g6

Driver, R., Guesne, E., Tiberghien, A. (1985). Children's ideas in science. Milton Keynes: Open University Press
g1,g6,g7

Finley, F.N. (1987). Changes in students' knowledge during a simulated search for oil. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 118-132
g6

Finley, F.N. (n.d.). Variations in prior knowledge. University of Maryland: Department of Curriculum and Instruction
g6

Fleming, R. (1988). Undergraduate science students' views, on the relationship between science, technology and society. International Journal of Science Education 10, 4, 449-463
g6,STS,SCS,OCI

Flick, L. (1990). Scientist in Residence Program. Improving children's image of science and scientists. School Science and Mathematics 90, 3, 204-214
g6,CSC,OIM,GEN

Galiardi, R., Mosconi Bernadini, P. (1988). Education a l'environnement: Utilisation des representations des eleves des ecoles italiennes pour la preparation d'un curriculum sur l'ecologie. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 521-527
g6

Garnett, P.J., Tobin, K., Swingler, D.G. (1985). Reasoning abilities of secondary school students aged 13-16 and implications for the teaching of science. European Journal of Science Education 7, 387-397
g6

Gates, L., Jay, B. (1978). Children's understanding of "all" and "some". Science Education 62, 3, 359-363
g6

George, J., Glasgow, J. (1987). Conventional science and street science in the West Indies. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 220-232
g6

George, J., Glasgow, J. (1988). Sources of students' conceptions in science: The cultural context. Paper prepared for the seminar "Learning in Science: Issues for Research and Practice", Leeds
g6

Gilbert, J.K., Osborne, R., Fensham, P.J. (1982). Children's science and its consequences for teaching. Science Education 66, 4, 623-633
g1,g6

Giordan, A. (1987). Bibliographie concernant les recherches sur les conceptions des apprenants en biologie. Annales de didactique des sciences No 2, BIODIC LDES
g1,g6

Gongora, J.A., Medrano, F. (1988). Application des etudes sur les representations pour l'elaboration des programmes educatifs scolaires. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 511-517
g6

Griffiths, K.M. (1979). An investigation into the development of concepts. Paper presented at the "Cognitive Development Research Seminar, Science and Mathematics Education", Leeds
g6

Gustafson, B.J. (1990). Children's changing conceptions. Paper presented to the 18th Annual Conference of the Canadian Society for the Study of Education, Victoria, British Columbia
g6,CTL,OCI

Haggerty, S.M. (1990). Student teachers' conceptions of science, of teaching and of learning: A progress report. London, Canada: University of Western Ontario
g6,CTL,CSC,OCI

Hagstedt, H., Spreckelsen, K. (1986). Wie Kinder physikalischen Phänomenen begegnen. Sachunterricht und Mathematik in der Primarstufe 14, 9, 318-323
g5,g6

Hallden, O. (1983). Teachers' questions and pupils problems: a commentary. European Journal of Science Education 5, 3, 333-336
g6

Hallden, O. (1988). Alternative frameworks and the concept of task. Cognitive constraints in pupils' interpretations of teachers' assignments. Scandinavian Journal of Educational Research 32, 123-140
g6,CTL

Hammer, D. (1990). Metaknowledge in introductory physics. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,CSC,CTL,OCI

Happs, J.C. (n.d.). Constructivism and subjectivity in adult decision-making about water quality. Paper presented at the 12th annual conference of the Western Australian Science Education Association, University of Western Australia 1986
g6,STS

Happs, J.C. (1982). Classifying rocks and minerals. New Zealand Science Teacher, 34, 20 ff
g6

Happs, J.C. (1982). Glaciers. Working paper of the Science Education Research Unit, University of Waikato, NZ
g6,OCI

Happs, J.C. (1982). Mountains. Working paper of the Science Education Research Unit, University of Waikato, NZ
g6,OCI

Happs, J.C. (1982). Some aspects of student understanding of soil. The Australian Science Teachers Journal 28, 3, 25-31
g6

Happs, J.C. (1982). Some aspects of student understanding of two New Zealand landforms. New Zealand Science Teacher, 32, 4 ff
g6

Happs, J.C. (1982). Some aspects of students understanding of rocks and minerals. Working paper of the Science Education Research Unit, University of Waikato, NZ
g6,OCI

Happs, J.C. (1984). Harnessing alternative frameworks in teacher training: An example from the earth sciences. Research in Science Education 14, 167-172
g6,g7

Happs, J.C. (1985). Cognitive learning theory and classroon complexity. Research in Science and Technological Education 3, 2, 159-174
g6,g7

Happs, J.C. (1985). Regression in learning outcomes: Some examples from the earth sciences. European Journal of Science Education 7, 431-443
g6

Happs, J.C., Stead, K. (1989). Using the repertory grid as a complementary probe in eliciting student understanding and attitudes towards science. Research in Science & Technological Education 7, 2, 207-220
g5,g6,CTL,OCI

Harlen, W. (1968). The development of scientific concepts in young children. Educational Research 11, 4-13
g6

Heepmann, B. (1968). "Kinder auf dem Wege zur Physik". Ein Versuch zur Gewinnung von Aufschlüssen über das kindliche Denken in verschiedenen Altersstufen aufgrund von Schüleräußerungen. I und II.. Zeitschrift für Naturlehre und Naturkunde 16, 265-268, 313-318
g6

Helm, H., Novak, J.D. (Eds.) (1983). Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University
g1,g6

Hill, D., Redden, M.G. (1985). An investigation of the system concept. School Science and Mathematics 85, 233-239
g6

Huang, J. (1930). Children's explanations of strange phenomena. Smith College Studies in Psychology 1, 63-181
g6

Huang, J. (1943). Children's conception of physical causality: A critical summary. Journal of Genetic Psychology 63, 71-121
g6

Inbody, D. (1963). Children's understandings of natural phenomena. Science Education 47, 270-278
g6

Inhelder, B. (1977). The development of the concepts of chance and probability in children. In: Overton, W., McCarthy Gallagher, J.: Knowledge and development. New York: Plenum Press, 43-57
g6,STAT,IRR

Jacobs, G. (1989). Word usage misconceptions among first-year university physics students. International Journal of Science Eduaction 11, 4, 395-399
g6

Jaide, W. (1954). Über die Entwicklung des kindlichen Verständnisses für Natur und Technik. Schule und Psychologie 1, 78-88
g6

Jaide, W. (1955). Das kindliche Verständnis für Natur und Technik. Neue Deutsche Schule 7, 284-287
g6

Johnson, C.N., Wellman, H.M. (1982). Children's developing conceptions of the mind and brain. Child Development 53, 222-234
g6

Jungwirth, E. (1987). Improper attribution of causality - a potential stumbling block for STS education. In: Riquarts, K.: Science and technology education and the quaility of life. Kiel: IPN-Materialien, 694-699
g6

Jungwirth, E. (1989). Secondary School pupils' and biology (student) teachers' attributions of cause-and-effect relationships in situations requiring suspension of judgement. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 285-294
g6

Karmiloff-Smith, A., Inhelder, B. (197[illegible]/75). "If you want to get ahead, get a theory". Cognition 3, 3, 195-212
g6

Karplus, R. (1979). Continuous functions: Students' viewpoints. European Journal of Science Education 1, 397-415
g6

King, W.H. (1961). The development of scientific concepts in children. British Journal of Educational Psychology 31, 1-20
g6

King, W.H. (1965). The development of scientific concepts in children. In: Gordon, J.F.: Human development (Readings in research). Chicago: Scott Foreman
g6

Kuethe, L.J. (1963). Science concepts: A study of "sophisticated" errors. Science Education 47, 361-364
g6

Kuhn, D., Phelps, H. (1976). The development of children's comprehension of causal direction. Child Development 47, 248-251
g6

Lederman, N.G. (1990). Students' perceptions of the nature of science: assessment, development, and sources of change. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g6,CSC,OCI

Lederman, N.G., O'Malley, M. (1990). Students' perceptions of tentativeness in science: development, use, and sources of change. Science Education 74, 2, 225-239
g5,g6,CSC,OCI

Licht, P., Eijkelhof, H.M.C., Boschhuizen, R., Bouma, J. (1988). Results of an international inventory of experiences with preservice and inservice education on pupils' preconceptions. Paper prepared for the 13th conference of the Association for Teacher Education in Europe, Barcelona
g6

Linn, M.C. (1979). Theoretical and practical significance of formal thought: some considerations. Paper presented at the Society for Research in Child Development Meeting. San Francisco, California
g1,g6

Linn, M.C. (1980). When do adolescents reason ? European Journal of Science Education 2, 4, 429-440
g1,g6

Lonka, K., Joram, E., Bryson, M. (1990). Students' changing conceptions of knowledge and learning. Poster presented at annual meeting of the American Educational Research Association, Boston MA
g6,CTL

Lovell, K. (1966). The growth of basic mathematical and scientific concepts in children. London: University of London Press
g6

Lovell, K. (1978). Das Wachsen des naturwissenschaftlichen Verständnisses im Kinde. Der Physikunterricht 12, 4, 20-31
g6

Lybeck, L. (n.d.). On didaktisk kunskapsbildning i matematik och naturvetenskapliga ämnen. In: Marton, F.: Fachdidaktik, Vol.3: Matematik, Naturorienterande ämnen.
g6

Lybeck, L. (1979). Studien über Mathematik im naturwissenschaftlichen Unterricht. physica didactica 6, 1, 25-55
g6

Lybeck, L. (1981). Arkimedes i klassen. Gothenburg: Gothenburg University
g6

Lynch, P.P. et aL. (1979). Scientific language and the High School pupil. Journal of Research in Science Teaching 16, 4, 351-357
g6

Lynch, P.P., Chipman, H.H., Pachaury, A.C. (1984). The language of science and the High School student: The recognition of concept definitions. Journal of Science and Mathematics Education in Southeast Asia 12, 2, 7-14
g4,g6

Maloney, D.P. (1987). Rule usage on related tasks: patterns of consistency. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 335-349
g6

Matthews, G.P., Brook, V.G., Elliot, G.S., Kahn-Gandapur, T.H. (1985). Cognitive structure determination as a pool in science teaching. Part 3: Results. European Journal of Science Education 7, 263-279
g5,g6

Mayer, M. (1986). La technologie employee dans la vie quotidienne. Influence-t-elle et vie quotidienne. In: Giordan, A., Martinand, J.L.: Education scientifique et vie quotidienne. Paris: Instaprint, 451-458
g1,g6

Mbiol, K.S. (1983). Selected science misconceptions amongst some Nigerian school certificate students. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 425-428
g6

Milkent, M.M. (1976). Comment on "Science Misconceptions Among Certain Groups of Students in Lebanon". Journal of Research in Science Teaching 13, 571-572
g6

Mothes, H. (1956). Wie werden Naturerscheinungen vom Kinde selbst gedeutet ? Zeitschrift für Naturlehre und Naturkunde 4, 54-57
g1,g6

Murphy, P., Schofield, B. (1984). Science at age 13. Leeds: Assessment for Performance Unit
g6

Neuberger, H.T. (1966). Conceptualizations of change held by ten and eleven year old children. Journal of Research in Science Teaching 4, 3, 180-181
g6

Novak, J.D. (1989). Concept maps and vee diagrams: Two metacognitive tools to facilitate meaningful learning. Ithaca: Cornwell University. Department of Education
g1,g6

Oakes, M.E. (1947). Children's explanations of natural phenomena. New York: Columbia University, Teachers College
g1,g6

Olstad, R.G., Haury, D.L. (1984). A summary of research in science education - 1982, "Conceptual Understanding". Science Education 68, 219-222, 315-363
g1,g6

Parsons-Chatman, S. (1989). The development of a model of tinkering: A study of children' s science. Paper presented at the annual meeting of the Canadian Association for Curriculum Studies. Canadian Society for Studies in Education. Quebec City
g1,g6

Piaget, J. (1930). The childs conception of physical causality. London: Kegan Paul
g6

Piaget, J., Inhelder, B. (1969). Die Entwicklung der physikalischen Mengenbegriffe beim Kinde. Stuttgart: Klett
g6

Piaget, J., Inhelder, B. (1975). The origin of the idea of chance in children. London: Routledge & Kegan Paul
g6,STAT,IRR

Preece, P.F.M. (1978). Associative structure and the schema of proportionality. Journal of Research in Science Teaching 15, 395-398
g6

Raspe, C. (1924). Kindliche Selbstbeobachtung und Theoriebildung. Zeitschrift für angewandte Psychologie 23, 302-328
g6

Rennie, L.J., Sillitto, F. (1988). The meaning of technology: Perceptions from the essays of year 8 students. The Australian Science Teachers Journal 34, 4, 68-76
g6,STS,GEN

Rogers, W.P. (1961). What do children belief ? Science Education 45, 133-137
g6

Rubba, P.A., Horner, J.K., Smith, J.M. (1981). A study of two misconceptions about the nature of science among Junior High School students. School Science and Mathematics 81, 3, 221-226
g6,CSC,GEN

Sarr, M. (1988). Quelques conceptions de jeunes saheliens sur la protection de la nature. In: Giordan, A.; Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 273-277
g6,sts

Schulte, W. (1980). Zur Bedeutung der Sprache im Physikunterricht. Untersuchungen über den Einfluß des Unterrichts auf das Verständnis physikalischer Termini. Göttingen: Universität Göttingen
g4,g6

Schwaneberg, R., Heege, R. (1981). Beziehungsdenken und Dingdenken. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1981. Gießen: I. Physikalisches Institut, 100-106
g6,OCI

Scriven, E.G. (1967). An analysis of types of concepts used by fourth through ninth graders in written explanations of scientific terms. Ithaca, N.Y.: Cornell University
g6

Segre, G., Giani, U., Masillo, S. (1987). Analogical reasoning and formalization in transport processes. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 420-423
g6

Siegler, R.S. (1976). The effects of simple necessity and sufficiency relationship on children's causal interferences. Child Development 47, 1058-1063
g6

Sneider, C., Kurlich, K., Pulos, S., Friedman, A. (1984). Learning to control variables with model rockets: a neo-Piagetian study of learning in field settings. Science Education 68, 463-484
g6,GEN,CTL

Snively, G. (1987). The metaphor interview and the analyses of conceptual change. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 434-447
g5,g6

Solomon, J. (1987). The pupils' view of electricity revisited: social development or cognitive growth ? International Journal of Science Education 9, 1, 13-22
g6,GEN

Spreckelsen, K. (1986). Wie Grundschüler sich physikalische Phänomene erschließen. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der GDCP-Tagung 1985. Alsbach: Leuchtturm, 252-255
g6

Stavy, R. (1981). Teaching inverse functions via the concentration of salt water solution. Archives de Psychologie 49, 267-287
g6

Stavy, R. (1987). Acquisition of conservation of matter. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 456-465
g6

Stepans, J., Kuehn, C. (1985). Children's conceptions of weather. Science and Children, 9, 44-47
g6,OCI

Stevens, A.L., Collins, A. (1978). Multible conceptual models of a complex system. Cambridge, Mass.: University press
g6,OCI

Sutton, C., West, L. (1982). Investigating children's existing ideas about science. A research seminar
g1,g6,CTL

Symington, D.J., Biddulph, F., Happs, J.C., Osborne, R. (1982). Learning in Science Project (Primary): Primary school pupils' ideas about rocks. Working Paper (No.107) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g6

Tan, S.K. (1987). A conceptualisation of students' meaning of understanding of physics in the High School classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 491-500
g6,CTL

Tasker, R. (1981). Children's views and classroom experiences. The Australian Science Tachers Journal 27, 3, 33-37
g1,g6,CTL

Tisher, R.P. (1967). "My father told me...": Children's explanations of some natural phenomena. Australian Journal of Education 11, 204-212
g6

Viennot, L. (1981). Common practice in elementary algebra. Journal of Research in Science Teaching 3, 183-194
g6

Voelker, A.M. (1972). Elementary school children's level of attainment of selected classificatory science concepts. Paper presented at the Annual Meeting of NARST, Chicago
g6

Watts, M., Ebbutt, D. (1988). Sixth-formers' views of their science education, 11-16. International Journal of Science Eduaction 10, 2, 211-219
g6,CTL

Za'rour, G.I. (1975). Science misconceptions among certain groups of students in Lebanon. Journal of Research in Science Teaching 12, 385-391,
g6

Za'rour, G.I. (1976). Interpretation of natural phenomena by Lebanese school children. Science Education 60, 2, 277-287
g6

Zietz, K. (1936). Die Physik des Kindes. Die Deutsche Schule 40, 263-269
g1,g6

Zietz, K. (1937). Kindliche Erklärungsversuche für Naturerscheinungen. Zeitschrift für pädagogische Psychologie 38, 219-228
g6,g8,OCI

Zietz, K. (1937). Physikalische Theorien bei Kindern. Bericht über den XV. Kongreß der Deutschen Gesellschaft für Psychologie, Jena, 232-238
g5,g6,g8,ORC

Zietz, K. (1939). Zur Entwicklung des kausalen Denkens bei Kindern. Zeitschrift für angewandte Psychologie und Charakterkunde 57, 50-58
g1,g6

Zohar, A., Tamir, P. (in press). The construction and use of an instrument which evaluates causal reasoning abilities in the context of learning biology. Journal of Biological Education
g6

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
E	- Elektrizität	- electricity

Aalst, H.V. (1985). The differentation between connections in series and in parallel from cognitive mapping. Implications for teaching. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 115-128
g6,g7,P,E

Arnold, M., Millar, R. (1987). Being constructive: an alternative approach to the teaching of introductory ideas in electricity. International Journal of Science Education 9, 5, 553-563
g7,P,E

Arnold, M., Millar, R. (n.d.). Teaching about electricity: a constructivist approach. Accepted for publication School Science Review
g7,P,E

Closset, J.L. (1985). Using cognitive conflict to teach electricity. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 267-273
g7,P,E

Cohen, R. (1985). Causual relations in electric circuits: students' concepts. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 107-113
g6,g7,P,E

Cosgrove, M., Osborne, R. (1985). A teaching sequence on electric current. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 112-123
g7,P,E

Cosgrove, M., Osborne, R., Carr, M. (1985). Children's intuitive ideas on electric circuit and the modifikation of those ideas. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 247-256
g6,g7,P,E

Cosgrove, M., Osborne, R., Carr, M. (1985). Using practical technological problems to promote conceptual change. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 257-266
g7,P,E

Dudeck, W.-G., Menge, S., Schwedes, H. (1990). Von Alltagsvorstellungen zu physikalischen Konzepten. Konstruktion von Unterrichtselementen in der Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 241-243
g7,P,E

Duit, R., Jung, W., Rhöneck, C. von (1985). Understanding and teaching electricity - a guide to the workshop's papers. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 9-38
g5,g6,g7,P,E

Duit, R., Jung, W., Rhöneck, C. von (Eds.) (1985). Aspects of understanding electricity. Proceedings of an international workshop in Ludwigsburg 1984. Kiel: Schmidt & Klaunig
g6,g7,P,E

Dupin, J.J., Johsua, S. (1985). Teaching electricity: Interactive evolution of representations, models and experiments in a class situation. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 331-341
g7,P,E

Dupin, J.J., Joshua, S. (1989). Analogies and "modeling analogies" in teaching: Some examples in basic electricity. Science Education 73, 2, 207-224
g7,P,E

Fischer, H.E. (1989). Lernprozesse im Physikunterricht. Bremen: Universität Bremen
g1,g5,g6,g7,P,E,OCI

Gauld, C.F. (1985). Teaching about electric circuits. Working paper. Science Education Research Unit. University of Waikato, 1-37
g7,P,E

Gauld, C.F. (1988). The cognitive context of pupils' alternative frameworks. International Journal of Science Education 10, 3, 267-274
g6,P,E,g7

Gohmert, B., Schilling, P. (1983). Geschlossene Wasserkreise - Modelle für elektrische Stromkreise ? Darstellung einer spielorientierten Unterrichtseinheit. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: 1. Physikalisches Institut, 270-275
g7,P,E

Härtel, H. (1985). The electric circuit as a system. In: Duit, R., Jung, W., Rhöneck, C. von: Understanding electricity - Proceedings of a workshop. Ludwigsburg: Pädagogische Hochschule
g7,P,E

Hauke, B. (1981). Ein an Schülervorstellungen orientierter Einstieg in die Elektrostatik. Naturwissenschaften im Unterricht - Physik/Chemie 29, 3, 103-109
g6,g7,P,E

Idar, J., Ganiel, U. (1985). Learning difficulties in High School Physics: Development of a remedial teaching method and assessment of its impact on achievement. Journal of Research in Science Teaching 22, 2, 127-140
g7,P,E

Johsua, S., Dupin, J.J. (1987). Taking into account student conceptions in instructional strategy: An example in physics. Cognition and Instruction 4, 2, 117-135
g7,P,E

Joshua, S., Dupin, J.J. (1986). Is the systematization of hypothetico-deductive reasoning possible in a class situation ? European Journal of Science Education 8, 4, 381-388
g7,P,E

Jung, W. (1984). Elementary electricity: An epistemological look at some empirical results. In: Duit, R., Jung, W., Rhöneck, C. von: Understanding electricity - Proceedings of a workshop. Ludwigsburg: Pädagogische Hochschule Ludwigsburg
g1,g7,P,E

Jung, W., Malchle, U., Weber, E., Wiesner, H. (1977). Probleme der Einführung elektrischer Grundbegriffe in der Sekundarstufe I. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 80-82
g7,P,E

Jung, W., Maichle, U., Weber, E., Wiesner, H. (1978). Probleme der Einführung elektrischer Grundbegriffe in der Sekundarstufe I. Naturwissenschaften im Unterricht - Physik/Chemie 26, 137-145
g7,P,E

Jung, W., Wiesner, H., Kiowski, I., Weber, E. (1982). Zum Anfangsunterricht in der Elektrizitätslehre. physica didactica 9, 257-272
g6,g7,P,E

Koumaras, P., Psillos, D., Tiberghien, A. (1989). Didactical transposition and pupils' learning. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 249-255
g7,P,E

Licht, P. (1985). Concept development in electricity: A strategy and some provisional results. Paper prepared for the International Symposium on Physics Teaching. Universite Libre de Bruxelles
g6,g7,P,E

Licht, P. (1987). A strategy to deal with conceptual and reasoning problems in introductory electricity education. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 275-284
g7,P,E

McDermott, L.C., Zee, E. van (1985). Identifying and adressing student difficulties with electric circuits. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 39-48
g6,g7,P,E

Menge, S., Schwedes, H. (1988). Transferprozesse von Wasserstromkreisen auf elektrische Stromkreise bei einzelnen Schülern. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 311-313
G6,G7,P,E

Menge, S., Schwedes, H. (1989). Untersuchung von Lern- und Transferprozessen im Physikunterricht zur Elektrizitätslehre. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie - Vorträge auf der Tagung für Didaktik der Physik/Chemie in Münster. Alsbach: Leuchtturm, 237-239
g6,g7,P,E

Osborne, R. (1983). Towards modifying children's ideas about electric current. Research in Science and Technological Education 1, 1, 73-82
g6,g7,P,E,OCI

Psillos, D., Koumaras, P., Tiberghien, A. (1988). Voltage presented as a primary concept in an introductory teaching sequence on DC circuits. International Journal of Science Education 10, 1, 29-43
g6,g7,P,E

Rhöneck, C. von, Grob, K. (1988). Representation and problem solving in basic electricity - predictors for successful learning. In: Duit, R., Säljö, R.: Students' conceptions of subject matter content. Proceedings of a symposium at the 2. Eur. Conf. for Research on Learning and Instruction, Tübingen, Sept. 1987. Kiel: IPN Reports-in-Brief, 57-83
g7,P,E

Schmidt, D. (1988). Anbahnung eines Konzeptwechsels zum elektrischen Stromkreis. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. : Vorträge auf der Tagung f. Didaktik d. Physik/Chemie, September 1987. Nürnberg: Leuchtturm-Verlag, Alsbach, 314-315
G7,P,E

Schmidt, D. (1988). Basiskonzepte: zentrale steuernde Elemente von Konzepten. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen. Gießen: DPG Fachausschuß Didaktik der Physik, 504-513
g7,P,E

Schmidt, D. (1989). Zum Konzeptwechsel: Eine Untersuchung über den Konzeptwechsel am elektrischen Stromkreis. Frankfurt/Main: Peter Lang
g1,g6,g7,P,E,OCI

Schwedes, H. (1983). Zur Kontinuitätsvorstellung bei Wasserstromkreisen und elektrischen Schaltungen. In: DPG-Fachausschuß Didaktik der Physik: Vorträge der Frühjahrstagung 1983. Gießen: 1. Physikalisches Institut, 264-269
g6,g7,P,E,OCI

Shipstone, D.M. (1985). Electricity in simple circuits. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 33-51
g6,g7,P,E

Shipstone, D.M. (1988). Pupils' understanding of simple electrical circuits - Some implications for instruction. Physics Education 23, 92-96
g6,g7,P,E

Shipstone, D.M., Gunstone, R. (1985). Teaching children to discriminate between current and energy. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 287-297
g7,P,E

Solomon, J. (1989). Social influence or cognitive growth. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 195-199
g1,g7,P,E,O

Steinberg, M.S. (1985). Construction of causal models: Experimenting with capacitor controlled transients as a means of promoting conceptual change. In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Kiel: Schmidt & Klaunig, 367-379
g7,P,E

Stork, E., Wiesner, H. (1981). Schülervorstellungen zur Elektrizitätslehre und Sachunterricht. Bericht über einen Versuch zur Integration von fachdidaktischer Forschung und schulpraktischer Ausbildung an der Universität. Sachunterricht und Mathematik in der Primarstufe 9, 218-230
g6,g7,P,E,OCI

Strack, D. (1987). Ein Unterrichtsversuch in einer Elektroinstallateurklasse zur Berücksichtigung von Schülervorstellungen in der Elektrotechnik am Beispiel der Berührungsspannung. Hausarbeit im Rahmen der Zweiten Staatsprüfung für das Lehramt an der Oberstufe - Berufliche Schulen - im Berufsfach Elektrotechnik, 1-31
g6,g7,P,E

Tasker, R., Osborne, R. (1985). Science teaching and science learning. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 15-27
g6,g7,P,E

Thorley, N.R., Treagust, D.F. (1987). Conflict within dyadic interactions as a stimulant for conceptual change in physics. International Journal of Science Education 9, 2, 203-216
g6,g7,P,M,E

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
T	- Wärme	- heat

Cachapuz, A.F.C., Maskill, R. (1987). Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. International Journal of Science Education 9, 4, 491-504
g5,g6,g7,C,P,T

Dall'Alba, G. (1988). Cognitive learning strategies and outcomes in a heat transfer experiment. Research in Science Education 18, 123-133
g7,P,T

Engel Clough, E., Driver, R. (1985). Secondary students' conceptions bringing together scientific and personal views. Physics Education 20, 175-182
g6,g7,P,T

Erickson, G.L. (1983). Student frameworks and classroom instruction. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 489-501
g1,g7,B,P,T

Erickson, G.L., Tiberghien, A. (1985). Heat and temperature. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,T

Grimellini Tomasini, N., Pecori Balanda, B. (1987). Teaching strategies and children's science: an experiment on teaching about hot and cold. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 158-171
g6,g7,P,T

Linn, M.C. (1987). Using the computer as a laboratory partner: cognitive consequences. Paper prepared for the symposium "Computers in school: cognitive and social processes", 2nd EARLI conference, Tübingen
g7,P,T

Rogan, J.M. (1988). Development of a conceptual framework of heat. Science Education 72, 1, 103-113
g7,P,T

Rosenquist, M., Popp, B.D., McDermott, L.C. (1983). Helping students overcome conceptual difficulties with heat and temperature. Paper presented at the summer meeting of the American Association of Physics Teachers in Ashland
g7,P,T

Stavy, R., Berkovitz, B. (1980). Cognitive conflict as a basis for teaching quantitative aspect of the concept of temperature. Science Education 64, 5, 679-692
g6,g7,P,T

Stavy, R., Strauss, S. (1983). Educational-developmental psychology and curriculum development: The case heat and temperature. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 292-303
g6,g7,P,T

Stein, J.S. (1987). Raising laboratory learning to a conceptual level: does MBL help ? In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics". Vol.III. Ithaca: Cornell University, 471-479
g7,P,T

Wiesner, H. (1985). Untersuchungen von Vorstellungen von Primarstufenschülern über Begriffe und Phänomene aus der Wärmelehre. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Physik/Chemie 1984. Alsbach: Leuchtturm, 242-244
g6,g7,P,T

Wiser, M. (1987). The use of MBL, simulations, and kinetic molecular models to teach thermal physics. Paper presented at the annual meeting of the American Educational Research Association
g7,P,T

Wiser, M., Kipman, D. (1988). The differentation of heat and temperature: An evaluation on the effect of microcomputer models on students' misconceptions. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g7,P,T

Zimmermann, M.L. (1990). Concept de chaleur. Geneve: Universite de Geneve
g6,g7,P,T,OCI,OIM

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
M	- Mechanik	- mechanics

Alvermann, D.E., Hague, S.A. (1988/89). Comprehension of counterintuitive science text: Effects of prior knowledge and text structure. International Education Research 82, 4, 197-202
g7,P,M

Alvermann, D.E., Hynd, C.R. (1989/90). Effects of prior knowledge activation modes and text structure on nonscience majors' comprehension of physics. Journal of Educational Research 83, 2, 97-102
g7,P,M

Arons, A.B. (1981). Thinking, reasoning and understanding in introductory physic courses. The Physics Teacher 17, 166-172
g6,g7,P,M

Bar, V. (1989). Introducing mechanics at the elementary school. Physics Education 24, 348-352
g6,g7,P,M

Bliss, J. (1989). A common sense theory of motion: A theoretical and empirical approach. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 266-272
g7,P,M

Boeha, B.B. (1989). Students' beliefs and the outcomes of physics instruction. Melbourne: Monash University
g1,g5,g6,g7,P,M

Brown, D.E., Clement, J. (1989). Overcoming misconceptions via analogical reasoning: factors influencing understanding in a teaching experiment. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g7,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Instructional consequences of students' knowledge about physical phenomena. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 61-90
g1,g7,P,M

Champagne, A.B., Gunstone, R.F., Klopfer, L.E. (1985). Effecting changes in cognitive structure among physics students. In: West, L., Pines, L.: Cognitive structure and conceptual change. Orlando: Academic Press, 163-187
g1,g5,g6,g7,P,M

Champagne, A.B., Klopfer, L.E. (1982). Laws of motion programs. Pittsburg: University of Pittsburg, Learning Research and Development Center
g7,P,M

Champagne, A.B., Klopfer, L.E. (1982). Laws of motion: Computer-simulated experiments in mechanics. Teacher's guide. New Rochelle, N.Y.: Educational Materials and Equipment Co.
g7,P,M

Champagne, A.B., Klopfer, L.E., Anderson, J. (1980). Factors influencing the learning of classical mechanics. American Journal of Physics 48, 1074-1079
g1,g6,g7,P,M

Clement, J. (1987). Overcoming students' misconceptions in physics: the role of anchoring intuitions and analogical validity. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 84-97
g7,P,M

Clement, J. (1987). The use of analogies and anchoring intuitions to remediate misconceptions in mechanics. Paper presented at the annual meeting of AERA, Washington D.C.
g7,P,M

Cross, R.T., Pitekethly, A. (1988). Speed, education and children as pedestrians: a cognitive change approach to a potentially dangerous naive concept. International Journal of Science Education 10, 5, 531-540
g6,g7,P,M,OCI

Cross, R.T., Pitkethly, A. (1989). A curriculum model to improve young children's concept of speed to reduce their pedestrian accident vulnerability. School Science and Mathematics 89, 4, 285-292
g7,P,M

De Jong, E.J., Gunstone, R.F. (1988). A longitudinal classroom study of mechanics. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g5,g6,g7,P,M,CTL

Dufresne, R., Gerace, W., Hardiman, P.T., Mestre, J. (1987). Hierarchially structured problem solving in elementary mechanics: guiding novices' problem analysis. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 116-130
g7,P,M

Engelhardt, P., Wiesner, H. (1983). Lernschwierigkeiten in der Mechanik und unterrichtliche Konsequenzen. Der Physikunterricht 17, 1, 15-34
g7,P,M

Feldsine, J.E. (1987). Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 177-181
g6,g7,P,C,M

Forman, G. (1990). The use of computer graphics and video replay to enhance the child's understanding of movement. Paper presented at the annual meeting of the American Education Research Association, Boston
g7,P,M,OIM

Fredette, N.H. (1987). Student use of computers to self-evaluate data from introductory physics laboratories. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 193-205
g7,P,M

Ganiel, U., Idar, J. (1985). Student misconceptions in science - How can computers help ? Journal of Computers in Mathematics and Science Teaching 4, 14-19
g7,P,M

Grimellini Tomasini, N., Gandolfi, E., Pecori Balandi, B. (1990). Teaching strategies and conceptual change: Sinking and floating at elementary school level. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,g7,P,M,OCI

Grimellini Tomasini, N., Pecori Balandi, B., Villani, A., Casadio, C., Pacca, J.L.A. (1989). Teaching strategies and conceptual change: the case of collisions in mechanics. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, California
g6,g7,P,M

Gunstone, R.F. (1988). Some long-term effects of uniformed conceptual change. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g7,P,M,CTL

Gunstone, R.F., Champgane, A.B., Klopfer, L.E. (1981). Instruction for understanding: A case study. The Australian Science Teachers Journal 27, 3, 27-32
g1,g7,P,M

Gunstone, R.F., Gray, R., Searle, P. (1987). Conceptual change: is it of value if students are ignorant of it ? Research in Science Education 17, 149-155
g7,P,M,CTL

Gunstone, R.F., Watts, M. (1985). Force and motion. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,M

Hewson, M.G., Hewson, P.W. (1983). Effect of instruction using students' prior knowledge and conceptual change strategies in science learning. Journal of Research in Science Teaching 20, 8, 731-743
g6,g7,P,M

Hewson, P.W. (1983). Microcomputers and conceptual change: The use of a microcomputer program to diagnose and remediate an alternative conception of speed. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g5,g7,P,M

Hynd, C.R., Alvermann, D.E. (1986). The role of refutation text in overcoming difficulty with science concepts. Journal of Reading 29, g7,P,M, 440-446
g7,P,M

Jung, W. (1977). Wege in die Mechanik. physica didactica 4, 219-229
g7,P,M

Jung, W. (1977). Zur Einführung des Kraftbegriffs. physica didactica 4, 171-187
g7,P,M

Jung, W., Callsen, H. (1976). Newtonsche Mechanik. Versuch eines neuen Zugangs für den Unterricht. Naturwissenschaften im Unterricht - Physik/Chemie 24, 231-236
g7,P,M

Jung, W., Reul, H., Schwedes, H. (1977). Untersuchungen zur Einführung in die Mechanik in den Klassen 3-6. Frankfurt/Main: Diesterweg
g1,g6,g7,P,M

Jung, W., Schwedes, H. (1977). Rechtzeitig lernen - Einführung in die Newtonsche Mechanik im 3. - 6. Schuljahr. Naturwissenschaften im Unterricht - Physik/Chemie 25, 225-234
g7,P,M

Jung, W., Weber, E., Wiesner, H. (1978). Ein Versuch zur Einführung des Energiebegriffs. Der Physikunterricht 12, 2, 22-41
g7,P,M,EN

Jung, W., Wiesner, H. (1979). Zur Definition fachdidaktischer Probleme am Beispiel der Mechanik. physica didactica 6, 203-216
g6,g7,P,M

Labudde, P., Reif, F., Quinn, L. (1988). Facilitation of scientific concept learning by interpretation procedures and diagnosis. International Journal of Science Education 10, 1, 81-98
g7,P,M

Marioni, C. (1989). Aspects of students' understanding in classroom settings (age 10-17): case study on motion and inertia. Physics Education 24, 273-277
g7,P,M

Minstrell, J. (1982). Explaining the "at rest" condition of an object. The Physics Teacher 20, 10-14
g7,P,M

Minstrell, J. (1990). A teaching system for diagnosing student' conceptions and prescribing relevant instruction. Paper prepared for a session of the American Educational Research Association titled "Classroom perspectives on conceptual change teaching", Boston
g6,g7,P,M,OCI

Nachtigall, D. (1985). Misconceptions in physics and a strategy to overcome them. In: Lijnse, P.L.: The many faces of teaching and learning mechanics in secondary and tertiary education. Utrecht: GIREP/SVO/UNESCO, 296-302
g6,g7,P,M

Niedderer, H. (1987). A teaching strategy based on students' alternative frameworks-theoretical concepts and examples. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 360-367
g1,g7,P,M

Niedderer, H. (1987). Alternative frameworks of students in mechanics and atomic physics. Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 335-348
g6,g7,P,M,Q,CSC

Ogborn, J. (1987). Prolog and models of reasoning in science. Physics Education 22, 225-229
g7,P,M

Osborne, R. (1985). Building on children's intuitive ideas. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 41-50
g6,g7,P,M

Ranney, M. (1987). Restructuring of motion in physics-naive students. Paper presented at the annual meeting of the AERA, Washington D.C., 1-8
g7,P,M

Roschelle, J. (1990). Designing for conversations. Paper presented at AAAI Symposium on Knowledge-Based Environments for Learning and Teaching, Stanford, and at AERA Symposium on Dynamic Diagrams for Model-Based Science Learning
g7,P,M

Rosenquist, M.L., McDermott, L.C. (1987). A conceptual approach to teaching kinetics. American Journal of Physics 55, 5, 407-415
g7,P,M

Rowell, J.A., Dawson, C.J., Lyndon, H. (1990). Changing misconceptions: a challenge to science educators. International Journal of Science Education 12, 2, 167-175
g1,g7,P,M

Schecker, H.P. (1990). The didactic potential of computer aided modeling for physics education. Bremen: University of Bremen, Institut of Physics Education
g7,P,M

Schultz, K., Murray, T., Clement, J., Brown, D. (1987). Overcoming misconceptions with a computer based tutor. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 434-447
g7,P,M

Sere, M.G. (1985). The gaseous state. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 104-123
g6,g7,P,M,OIM,OCI

Sere, M.G., Weil-Barais, A. (1989). Physics education and students' development. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 105-123
g7,P,M

Smith, C., Snir, J., Grosslight, L. (1987). Teaching for conceptual change using a computer-based modelling approach: The case of weight/density differentiation. Cambridge: Educational Technology Center
g7,P,M

Smith, C., Snir, J., Unger, C.M., Grosslight, L. (1990). Facilitating conceptual differentiation using conceptual models. Paper presented at the annual meeting of the American Educational Research Association, Boston MA
g7,P,M

Solomon, J. (1982). How children learn about energy or does the first law come first ? The School Science Review 63, 224, 415-422
g6,g7,P,M,EN,OCI

Solomon, J. (1983). Learning about energy: How pupils think in two domains. European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Stepans, J., Dyche, S. (1987). Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 466-480
g6,g7,P,M,B

Stepans, J., Dyche, S., Beiswenger, R. (1988). The effect of two instructional models in bringing about a conceptual change in the understanding of science concepts by prospective elementary teachers. Science Education 72, 2, 185-195
g7,P,M

Terry, C., Jones, G. (1986). Alternative frameworks: Newton's third law and conceptual change. European Journal of Science Education 8, 3, 291-298
g6,g7,P,M

Thorley, N.R., Treagust, D.F. (1987). Conflict within dyadic interactions as a stimulant for conceptual change in physics. International Journal of Science Education 9, 2, 203-216
g6,g7,P,M,E

Ueno, N., Arimoto, N., Fujita, G. (1990). Conceptual models and points of view - Learning via making a new stage. Paper presented at annual meeting of the American Educational Research Association, Boston
g7,P,M

van den Berg, J., Raat, J. (1985). Problem solving in mechanics - An experiment in mechanics teaching. In: Lijnse, P.L.: The many faces of teaching and learning mechanics. Conference on physics education. Utrecht: GIREP/SVO/UNESCO, 329-335
g6,g7,P,M

Van Hise, Y.A. (1988). Student misconceptions in mechanics: An international problem ? The Physics Teacher 26, 11, 498-502
g6,g7,P,M

van't Hul, F.E., van Joolingen, W.R., Lijnse, P.L. (1989). Begripsverandering en microcomputers, praktijkervaringen met kracht en beweging. Tijdschrift voor Didactiek der β-wetenschappen 7, 3, 172-191
g7,P,M

White, B. (1984). Designing computer games to help physics students understand Newton's laws of motion. Cognition and Instruction 1, 1, 69-108
g7,P,M

Zietsman, A.I., Clement, J. (1990). Using anchoring conceptions and analogies to teach about levers. Paper presented at the annual meeting of the American Educational Research Association, Boston MA
g7,P,M,OCI

Zietsman, A.I., Hewson, P.W. (1986). Effect of instruction using microcomputer simulations and conceptual change strategies on science learning. Journal of Research in Science Teaching 23, 1, 27-39
g7,P,M

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik Area of physics
O - Optik - optics

Anderson, C.W., Smith, E.L. (1983). Children's conceptions of light and color: Understanding the concept of unseen rays. East Lansing: Michigan State University
g6,g7,P,O

Anderson, C.W., Smith, E.L. (1984). Children's preconceptions and content-area textbooks. In: Duffy, G., Roehler, L.R., Mason, J.: Comprehension instruction: Perspectives and suggestions. New York: Longman, 187-201
g6,g7,P,O,B

Bouwens, R.E.A., Verkerk, G. (1989). De inrichting van een optica-curriculum, uitgaande van misconcepties. Tijdschrift voor Didactiek der β-wetenschappen 7, 1, 27-44
g7,P,O

Claus, J., Stork, E., Wiesner, H. (1982). Optik im Sachunterricht. Eine empirische Untersuchung zu Vorstellungen und Lernprozessen. Sachunterricht und Mathematik in der Primarstufe 10, 82-92
g6,g7,P,O

Eaton, J.F., Anderson, C.W., Smith, E.L. (1984). Students' misconceptions interfere with science learning: Case studies of fifth-grade students. The Elementary School Journal 84, 4, 365-379
g6,g7,P,O

Engelhardt, P., Wiesner, H. (1985). Bericht über eine Einführung in die Optik in einer 7. Klasse. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1985. München: DPG Fachausschuß Didaktik der Physik, 239-243
g7,P,O

Feher, E. (1990). Interactive museum exhibits as tools for learning: explorations with light. International Journal of Science Education 12, 1, 35-49
g5,g7,P,O

Feher, E., Rice, K. (1986). Shadow. Science and Children
g7,P,O

Fetherstonhaugh, A.R. (1988). Students' understanding of light: Can teaching for conceptual change lower the level of misconception ? Perth, Western Australia: Curtin University of Technology
g5,g6,g7,P,O,OCI

Fetherstonhaugh, A.R., Happs, J.C. (1988). Countering fundamental misconceptions about light. An analysis of specific teaching strategies with year 8 students. Research in Science Education 18, 211-219
g6,g7,P,O,OCI

Fetherstonhaugh, T., Treagust, D.F. (1990). Students' understanding of light and its properties following a teaching strategy to engender conceptual change. Paper presented at the Special Interest Group on Subject Matter Knowledge and Conceptual Change of the annual meeting of the A.E.R.A., Boston, MA, 16-20 April 1990
g6,g7,P,O

Goldberg, F. (1987). Using an interactive videodisc as a tool for investigating and facilitating student understanding in geometrical optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 180-186
g7,P,O

Goldberg, F.M., McDermott, L.C. (1986). Student difficulties in understanding image formation by a plane mirror. The Physics Teacher 24, 8, 472-480
g6,g7,P,O

Guesne, E. (1985). Light. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 10-33
g6,g7,P,O

Hoffmann, K., Wiesner, H. (1982). Lassen sich Alltagsvorstellungen über optische Phänomene durch Unterricht wirksam korrigieren ? physica didactica 9, 299-317
g6,g7,P,O

Hoffmann, K., Wiesner, H. (1984). Ein subjektivistischer Zugang zur Optik in der Sekundarstufe I. Bericht über einen Unterrichtsversuch zur Vermittlung der Sender-Empfänger-Vorstellung. Naturwissenschaften im Unterricht - Physik/Chemie 32, 7-11
g6,g7,P,O

Reiner, M., Finegold, M. (1987). Changing students' explanatory frameworks concerning the nature of light using real time computer analysis of laboratory experiments and computerized explanatory simulations of e.m. radiation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 368-377
g7,P,O

Solomon, J. (1989). Social influence or cognitive growth. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 195-199
g1,g7,P,E,O

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik **Area of physics**
AT - Atome / Teilchen **- atoms / particles**

Andersson, B. (1990). Pupils' conceptions of matter and its transformations (age 12-16). Studies in Science Education 18, 53-85
g6,g7,P,AT,C

Berkheimer, G.D., Anderson, C.W., Spees, S.T. (1988). Using conceptual change research to reason about curriculum. East Lansing: Michigan State University
g6,g7,P,AT

Dierks, W. (1989). An approach to the educational problem of introducing the discontinuum concept in secondary chemistry teaching and an attempted solution. Paper submitted to the international seminar on "Relating Macroscopic Phenomena to Microscopic Particles", Utrecht
g7,C,P,AT

Jung, W. (1971). Zur Behandlung der Atomphysik in der Sekundarstufe. Naturwissenschaften im Unterricht - Physik/Chemie 19, 1-8
g7,P,AT

Marcus, W., Pfundt, H. (1975). Die Entwicklung und Erhärtung der Hypothese vom diskontinuierlichen Aufbau der Stoffe. Der mathematische und naturwissenschaftliche Unterricht 28, 8, 472-477
g7,C,P,AT

Nussbaum, J. (1985). The particulare nature of matter in the gaseous phase. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,AT

Nussbaum, J., Novick, S. (1982). Alternative frameworks, conceptual conflict and accommodation: Toward a principled teaching strategy. Instructional Science 11, 183-200
g7,P,AT

Osborne, R., Schollum B. (1983). Coping in chemistry. The Australian Science Teachers Journal 29, 1, 13-24
g6,g7,P,AT,C,OCI

Pfundt, H. (1978). Zur Einführung der Atomhypothese. In: Weninger, J., Pfundt, H.: Atommodelle im naturwissenschaftlichen Unterricht, Band 2. Weinheim: Beltz, 10-24
g7,C,P,AT

Schollum, B., Osborne, R.J. (1985). Relating the new to the familiar. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 51-65
g6,g7,P,AT

Scott, P. (1987). The process of conceptual change in science: a case study of the development of a secondary pupil's ideas relating to matter. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 404-419
g6,g7,P,AT

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Wightman, T., Green, P., Scott, P. (1986). Children's learning in science project. The construction of meaning and conceptual change in classroom settings: Case studies on the particulate nature of matter. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,g7,P,AT

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P - Bereich der Physik	Area of physics
AS - Astronomie	- astronomy

Nussbaum, J. (1985). The earth as a cosmic body. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press
g6,g7,P,AS,OCI

Nussbaum, J., Sharodini-Dagan, N. (1983). Changes in second grade children's preconceptions about the earth as a cosmic body resulting from a short series of audio-tutorial lessons. Science Education 67, 99-114
g6,g7,P,AS

Sneider, C., Pulos, S., Freenor, E., Porter, J., Templeton, B. (1986). Understanding the earth's shape and gravity. Learning 14, 6, 43-47
g7,P,AS

Targan, D.S. (1987). A study of conceptual change in the content domain of the lunary phase . In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 499-511
g6,g7,P,AS

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Vosniadou, S., Brewer, W.F. (1989). Mental models of the earth: A study of conceptual change in childhood. University of Illinois: Center for the Study of Reading
g6,g7,P,AS,OCI

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik	Area of physics
EN	- Energie	- energy

Alanach, D., Anderson, M., Brook, A., Davidson, J., Dow, A., Driver, R., Gater, S., Hughes, D., Kent, D., Powell, D., Price, B., Wells, P. (1987). Approaches to teaching energy. Leeds: Centre for Studies in Science and Math. Education/University of Leeds
g7,P,EN

Black, P., Solomon, J. (1983). Life world and science world: Pupils' ideas about energy. In: Marx, G.: Entropy in the school. Proceedings of the 6th. Danube Seminar on Physics Education. Budapest: Roland Eötvös Physical Society, 43-55
g6,g7,P,EN,ENT

Brook, A.J. (1987). Designing experiences to take account of the development of children's ideas: an example from the teaching and learning of energy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 49-64
g7,P,EN

Brook, A.J., Wells, P. (1988). Conserving the circus ? - An alternative approach to teaching and learning about energy. Physics Education 23, 80-85
g7,P,EN

Carr, M., Kirkwood, V. (1988). Teaching and learning about energy in New Zealand Secondary School junior science classrooms. Physics Education 23, 86-91
g7,P,EN

Carr, M., Kirkwood, V., Newman, B. (1987). Energy in three New Zealand Secondary School junior science classrooms. Working Paper No.307, University of Waikato, Learning in Science Project, 1-19
g7,P,EN

Carr, M., Kirkwood, V., Newman, B., Birdwhistel, R. (1987). Energy in three New Zealand Secondary School junior science classrooms. Research in Science Education 17, 117-128
g6,g7,P,EN,OCI

Griffiths, A.K., Thomey, K., Cooke, B., Normore, G. (1988). Remediation of student-specific misconceptions relating to three science concepts. Journal of Research in Science Teaching 25, 9, 709-719
g7,P,EN,C,B

Jung, W., Weber, E., Wiesner, H. (1978). Ein Versuch zur Einführung des Energiebegriffs. Der Physikunterricht 12, 2, 22-41
g7,P,M,EN

Kirkwood, V., Carr, M. (1988). "A most valuable growing exercise". A report on the interaction of teachers with the action-research phase. Research in Science Education 18, 95-103
g7,g9,P,EN

Kirkwood, V., Carr, M. (1988). Final Report: Learning in Science Project. Working paper (final report) of the Science Education Research Unit,University of Waikato, Hamilton N.Z.
g7,P,EN

Kirkwood, V., Carr, M. (1989). A valuable teaching approach: some insights from LISP (Energy). Physics Education 24, 332-334
g7,P,EN

Kirkwood, V., Carr, M., Bell, B., McChesney, J., Osborne, R., Symington, D. (1986). LISP (Energy): The strategy and some preliminary findings. Hamilton, N.Z.: University of Waikato
g7,g8,P,EN

Kirkwood, V., Carr, M., Gibb, S. (1986). Energy in New Zealand Secondary School junior science classroom, case study A. Working Paper No.304, University of Waikato, Learning in Science Project, 1-130
g7,P,EN

Kirkwood, V., Carr, M., Gibb, S., Shaw, J., Stonyer, J. (1988). Energy in New Zealand Secondary School junior science classrooms - Action research of a trial unit. Working paper (No.309) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,P,EN,OIM,OCI

Kirkwood, V., Carr, M., Gibb, S., Shaw, J., Stonyer, J. (1988). Teachers' interactions with LISP (energy) research . Working paper (No.310) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,g8,EN,P,CTL,CSC

Kirkwood, V., Carr, M., Newman, B. (1988). Energy in New Zealand Secondary School junior science classrooms - a trial unit. Working paper (No.308) of the Learning in Science Project, Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,P,EN,OCI,GEN

Kirkwood, V., Carr, M., Shaw, J. (1987). Energy in New Zealand Secondary School junior science classroom, case study C. Working Paper No.306, University of Waikato, Learning in Science Project, 1-115
g7,P,EN

Kirkwood, V., Carr, M., Stonyer, J. (1987). Energy in New Zealand Secondary School junior science classroom, case study B. Working Paper No.305, University of Waikato, Learning in Science Project, 1-153
g7,P,EN

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Solomon, J. (1982). How children learn about energy or does the first law come first ? The School Science Review 63, 224, 415-422
g6,g7,P,M,EN,OCI

Solomon, J. (1983). Learning about energy: How pupils think in two domains. European Journal of Science Education 5, 1, 49-59
g6,g7,P,M,EN

Solomon, J. (1985). Teaching the conservation of energy. Physics Education 20, 165-170
g6,g7,P,EN

Trumper, R. (1990). Energy and a constructivist way of teaching. Physics Education 25, 4, 208-212
g7,P,EN

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

P	- Bereich der Physik - Sonstige	Area of physics - others

Arons, A.B. (1983). Students patterns of thinking and reasoning part 1. The Physics Teacher 21, 576-581
g7,P

Arons, A.B. (1984). Students patterns of thinking and reasoning part 2, part 3. The Physics Teacher 22, 21-26, 88-93
g7,P

Bethge, T. (1988). Empirische Untersuchungen über Schülervorstellungen zur Quantenphysik. In: Kuhn, W.: Didaktik der Physik. Vorträge der Physikertagung in Gießen. Gießen: DPG Fachausschuß Didaktik der Physik, 249-254
g7,P,Q

Ennenbach, W. (1983). The influence of model-instruction on "Conception- and Misconception-Learning" in biology and physics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 32-38
g7,B,P

Finegold, M., Reiner, M. (1985). Student learning behaviors as a means for a cognitive evaluation of a physics program. Studies in Educational Evaluation 11, 105-111
g7,P

Fischler, H., Lichtfeldt, M. (1990). Quantenphysik in der Schule II: Eine neue Konzeption und ihre Evaluation. physica didactica 17, 1, 33-50
g7,P,Q,OCl

Genin, C., Pellet, A., Michaud-Bonnet, J. (1987). Structuration mathematique des representations des eleves scientifiques a propos des grandeurs physiques vectorielle. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 112-116
g6,g7,P

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel,Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Lichtfeldt, M. (1989). Evaluation eines Unterrichtsentwurfes zur Einführung in die Quantenphysik. In: Kuhn, W.: Didaktik der Physik. Vorträge auf der Physikertagung 1989 in Bonn. Gießen: Deutsche Physikalische Gesellschaft, Fachausschuß Didaktik der Physik, 394-400
g6,g7,P,Q

Malony, D.P. (1984). Cognitive physics educational research - a bibliography. Creighton, Omaha: University of Craighton, Physics Department
g1,g6,g7,P

Mestre, J., Touger, J. (1989). Cognitive research - What's in it for physics teachers ? The Physics Teacher 27, 9 , 447-456
g1,g7,P

Niedderer, H., Schecker, H., Bethge, T. (1989). Computer-based modelling, student-centered teaching strategy and the development of physics concepts. Paper based upon the research and development project "Computers in Physics Education", University of Bremen, Federal Republic of Germany
g7,P

Vegting, P. (1980). Education based on a new concept of teaching in physics. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 320-327
g7,P

Wesley, W. (1987). Toward a cognitive physics course. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 578-580
g7,P

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER

INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

C - Bereich der Chemie Area of chemistry

Allen, J. (1990). Effects of concept mapping on meaningful learning and achievement in secondary chemistry. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta
g7,C

Andersson, B. (1990). Pupils' conceptions of matter and its transformations (age 12-16). Studies in Science Education 18, 53-85
g6,g7,P,AT,C

Cachapuz, A.F.C., Maskill, R. (1987). Detecting changes with the learning in the organization of knowledge: use of word association tests to follow the learning of collision theory. International Journal of Science Education 9, 4, 491-504
g5,g6,g7,C,P,T

Dierks, W. (1988). Wer braucht wirklich auch das Mol auf dem Wege zum Symbol ? Naturwissenschaften im Unterricht - Physik/Chemie 36, 29-32
g7,C

Dierks, W. (1989). An approach to the educational problem of introducing the discontinuum concept in secondary chemistry teaching and an attempted solution. Paper submitted to the international seminar on "Relating Macroscopic Phenomena to Microscopic Particles", Utrecht
g7,C,P,AT

Feldsine, J.E. (1987). Distinguishing student misconceptions from alternative frameworks trough the construction of concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 177-181
g6,g7,P,C,M

Garnett, P.J., Garnett, P.J., Treagust, D.F. (1990). Implications of research on students' understanding of electrochemistry for improving science curricula and classroom practice. International Journal of Science Education 12, 2, 147-156
g6,g7,C,OCI

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Griffiths, A.K., Thomey, K., Cooke, B., Normore, G. (1988). Remediation of student-specific misconceptions relating to three science concepts. Journal of Research in Science Teaching 25, 9, 709-719
g7,P,EN,C,B

Hammer, H.D. (1990). Hinführung zur Gibbs-Helmholtz-Beziehung aus Alltagserfahrungen und Alltagsvorstellungen zum Verständnis der Richtung von Prozessen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 302-304
g7,C

Hand, B.M. (1988). Is conceptual conflict a viable teaching strategy ?: The students' viewpoint. The Australian Science Teachers Journal 34, 4, 22-26
g7,C

Hand, B.M., Treagust, D.F. (1988). Application of a conceptual conflict teaching strategy to enhance student learning of acids and bases. Research in Science Education 18, 53-63
g7,C

Herron, J.D. (1984). Using research in chemical education to improve my teaching. Journal of Chemical Education 61, 10, 850-854
g7,C

Hesse, J.J., Anderson, C.W. (1990). A case study of conceptual change teaching: Teaching the necessity of conservation in physical and chemical changes. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta
g7,g8,C,OCI,CTL

Krause, H. (1962). Wie deuten Kinder chemische Vorgänge ? Westermanns Pädagogische Beiträge 14, 359-365
g7,C

Krause, H. (1964). Von der Luft und dem Feuer. Westermanns Pädagogische Beiträge 16, 10-19
g7,C

Krause, H. (1965). Die Verbrennung der Metalle. Westermanns Pädagogische Beiträge 17, 1-16
g7,C

Krause, H. (1966). Die Verbrennung der Kohle. Westermanns Pädagogische Beiträge 18, 1-12
g7,C

Krause, H. (1967). Die Verbrennung der Kerze. Westermanns Pädagogische Beiträge 19, 1-16
g7,C

Marcus, W., Pfundt, H. (1975). Die Entwicklung und Erhärtung der Hypothese vom diskontinuierlichen Aufbau der Stoffe. Der mathematische und naturwissenschaftliche Unterricht 28, 8, 472-477
g7,C,P,AT

Mellouk, B. (1987). Les fondements epistemologiques d'un manuel de science. Quebec: Universite Laval
g7,C

Osborne, R., Schollum, B. (1983). Coping in chemistry. The Australian Science Teachers Journal 29, 1, 13-24
g6,g7,P,AT,C,OCI

Pfundt, H. (1975). Ursprüngliche Erklärungen der Schüler für chemische Vorgänge. Der mathematische und naturwissenschaftliche Unterricht 28, 157-162
g7,C

Pfundt, H. (1978). Zur Einführung der Atomhypothese. In: Weninger, J., Pfundt, H.: Atommodelle im naturwissenschaftlichen Unterricht, Band 2. Weinheim: Beltz, 10-24
g7,C,P,AT

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

Voorde, H.H. ten (1980). Education based on a new concept of teaching in chemistry. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 310-319
g5,g7,C

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

B - Bereich der Biologie Area of biology

Anderson, C.W., Sheldon, T., Dubay, J. (1985). The effects of instruction of college non-majors' conceptions of respiration and photosynthesis. Paper presented at the annual meeting of American Educational Research Association, Chicago
g7,B

Anderson, C.W., Smith, E.L. (1984). Children's preconceptions and content-area textbooks. In: Duffy, G., Roehler, L.R., Mason, J.: Comprehension instruction: Perspectives and suggestions. New York: Longman, 187-201
g6,g7,P,O,B

Arnold, B., Simpson, M. (1982). Concept development and diagnostic testing - osmosis in "o" grade biology. Aberdeen: Aberdeen College of Education
g7,B

Barenholz, H., Tamir, P. (1987). The design, implementation and evaluation of a microbiology course with special reference to misconceptions and concept maps. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 32-45
g7,B

Barenholz, H., Tamir, P. (in press). A comprehensive use of concept mapping in design, instruction and assessment. Journal of Research in Science Teaching
g7,B

Barker, M., Carr, M. (1989). Photosynthesis - can our pupils see the wood for the trees ? Journal of Biological Education 23, 1, 41-44
g7,B

Barker, M., Carr, M. (1989). Teaching and learning about photosynthesis. Part 1: An assessment in terms of students' prior knowledge. International Journal of Science Education 11, 1, 49-56
g7,B

Bell, B., Barker, M. (1982). Towards a scientific concept of "animal". Journal of Biological Education 16, 3, 197-200
g6,g7,B

Bell, B., Freyberg, P. (1985). Language in the science classroom. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 29-40
g4,g5,g7,B

Biddulph, F. (1982). Learning in Science Project (Primary): Primary school children's ideas about spiders. Working Paper (No.108) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,B,OCI

Boujaada, E. (1988). Les representations du fonctionnement du systeme nerveux vehiculees par le discours d'un manuel de biologie maocain au secondaire, et leur incidence sur la conception de l'apprentissage. Laval: Universite Laval
g7,B

Brody, M. (1990). Microcomputer based knowledge reconstruction in preservice elementary science education. Paper presented at the annual meeting of the American Educational Research Association, Boston
g7,B

Cho, H.H., Kahle, J.B., Nordland,F.H. (1985). An investigation of High School biology textbooks as sources of misconceptions and difficulties in genetics and some suggestions for teaching genetics. Science Education 69, 707-719
g6,g7,B

Eisen, Y., Stavy, R. (1989). Development of a new science study unit following research on students' ideas about photosynthesis: A case study. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 295-302
g7,B

Ennenbach, W. (1983). The influence of model-instruction on "Conception- and Misconception-Learning" in biology and physics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 32-38
g7,B,P

Erickson, G.L. (1983). Student frameworks and classroom instruction. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 489-501
g1,g7,B,P,T

Fisher, K.M., Faletti, J. (1989). Student strategies in building semantic networks in biology. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g7,B

Giordan, A. (1984). Learning process (and obstacles thereto) of science pupils aged 6-14. Council of Europe, Council for cultural co-operation, Educational research workshop on science in primary education. Edinburgh
g6,g7,B

Giordan, A., Vecchi, G. de (1987). Les origines du savoir. Neuchatel, Paris: Delachaux & Niestle
g1,g3,g5,g6,g7,P,C,B

Griffiths, A.K., Thomey, K., Cooke, B., Normore, G. (1988). Remediation of student-specific misconceptions relating to three science concepts. Journal of Research in Science Teaching 25, 9, 709-719
g7,P,EN,C,B

Happs, J.C., Scherpenzeel, L. (1987). Achieving long term conceptual change using the learners prior knowledge and a novel teaching setting. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 172-181
g6,g7,B

Heinze-Fry, J.A., Novak, J.D. (1990). Concept mapping brings long-term movement toward meaningful learning. Science Education 74, 4, 461-472
g7,B

Kinnear, J.. (1983). Identification of misconceptions in genetics and the use of computer simulations in their correction. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 84-92
g6,g7,B

Martinez Oroz, C., Gagliardi, R. (1988). Les modeles sur la croissance et leur utilisation dans l'enseignement. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 215-219
g7,B

Perez de Eulate, L., Galiardi, R. (1988). Les representations des eleves dans la formation des instituteurs en biologie. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 551-555
g7,B

Ryman, D. (1974). The relative effectiviness of teaching methods on pupils' understanding of the classification of living organisms at two levels of intelligence. Journal of Biological Education 8, 219-223
g7,B

Ryman, D. (1977). Teaching method, intelligence and gender factors in pupil achievment on a classification task. Journal of Research in Science Teaching 14, 401-409
g7,B,GEN

Sanford, J.P., Schmidt French, B. (1986). Teaching and learning genetics: A case studies of academic work in two classrooms. Paper presented at the annual meeting of the American Education Research Association, San Francisco
g6,g7,B

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C. (1987). Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 390-403
g6,g7,g8,B

Simpson, M,. Arnold, B. (1982). Educational psychology and the teaching of specialist subjects. Scottish Educational Review 14, 2, 109-117
g6,g7,B

Simpson, M., Arnold, B. (1983). Diagnostic tests and criterion-referenced assessment: their contribution to the resolution of pupil learning difficulties. Programmed Learning and Educational Technology 20, 1, 36-42
g1,g6,g7,B

Simpson, M., Arnold, B. (1984). Diagnosis in action. Aberdeen: Aberdeen College of Education
g6,g7,P,EN,AT,B

Simpson, M., Arnold, B. (1986). Readings on learning difficulties in secondary school science - reprints from ACE biology newsletter. Aberdeen: Aberdeen College of Education
g6,g7,B

Stepans, J., Dyche, S. (1987). Using the personal interview to determine student misunderstandings in science and some suggestions for alleviating those misunderstandings. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 466-480
g6,g7,P,M,B

Stewart, J., Streibel, M., Colins, A. (1987). Computers as tutors: Mendel as an example. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 477-489
g7,B

Treagust, D.F. (1987). An approach for helping students and teachers diagnose misconceptions in specific science content areas. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 512-522
g5,g6,g7,P,C,B,AS

g7 UNTERRICHT UNTER BERÜCKSICHTIGUNG VON VORSTELLUNGEN DER SCHÜLER
INSTRUCTION TAKING STUDENT'S NOTIONS INTO ACCOUNT

Sonstige others

Abdeljabbar, M. (1986). Quelle methodologie d'identification des representations des eleves dans le contexte extra-scolaire et scolaire. In: Giordan, A., Martinand, J.L.: Feuilles d'epistemologie appliquee et de didactique des sciences. Paris: Instaprint, 33-38
g7

Alvarez, M.C., Risco, V.J. (1987). Using vee diagrams to clarify third-grade students' misconceptions during a science experiment. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.I. Ithaca: Cornell University, 6-14
g5,g7

Arnaudin, M.W., Mintzes, J.J., Dunn, C.S., Shafer, T. (1984). Concept mapping in college science teaching. Journal of College Science Teaching 14, 117-121
g7

Biddulph, F. (1985). Learning in Science Project (Primary): Children's questions in the classroom: The experience of teachers and pupils. Working paper of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7

Biddulph, F., Symington,D., Osborne, R. (1984). Learning in Science Project (Primary): The place of children's questions in primary science education. Working Paper (No.132) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7

Bliss, J., Ogborn, J. (1989). Tools for exploratory learning. Journal of Computer Assisted Learning 5, 37-50
g7

Brady, C. (1970). Science teaching and the development of scientific concepts in children. School Science Review 51, 765-770
g7

Brody, M.J. (1987). A programmatic approach to teaching and learning about students understanding of science and natural resource concepts related to environmental issues. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 67-80
g6,g7,STS

Brown, D.E., Clement, J. (1987). Overcoming misconcepts in mechanics: A comparsion of two example-based teaching strategies. Paper presented at annual meeting of the American Educational Research Association, Washington D.C.
g7,O,M,OCI

Cleare, C. (1983). Using concept mapping to detect interventions effective in improving pre-service elementary education majors' understanding of science topics. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 137-141
g7

Clement, J. (1981). Analogy generation in scientific problem solving. Proceedings of the Third Annual Meeting of the Cognitive Science Society
g1,g7

Cosgrove, M., Osborne, R., Tasker, R. (1986). Towards generative learning. Working paper (No.205) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g1,g7,OCI

Dekkers, J., Malone, J. (1982). The concept map as an aid to instruction in science nad mathematics. Bentley: University of Western Australia, Science nad Mathematics Education Centre
g1,g7

Di Sessa, A.A. (1985). Knowledge in pieces. Berkeley: University of California
g1,g7

Driver, R. (1986). The approach of the children's learning in science project. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g1,g7

Driver, R. (1987). Promoting conceptual change in classroom settings: the experience of the Children's Learning in Science Project. In: Novak, J.: Proceedings of the 2. Int Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 97-107
g1,g7

Driver, R. (1989). Changing conceptions. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 79-103
g1,g7

Driver, R., Guesne, E., Tiberghien, A. (1985). Children's ideas in science. Milton Keynes: Open University Press
g1,g6,g7

Driver, R., Guesne, E., Tiberghien, A. (1985). Children's ideas and the learning of science. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 1-9
g1,g7

Driver, R., Guesne, E., Tiberghien, A. (1985). Some features of children's ideas and their implications for teaching. In: Driver, R., Guesne, E., Tiberghien, A.: Children's ideas in science. Milton Keynes: Open University Press, 193-201
g1,g7

Fowler, T.W., Bou Jaoude, S. (1987). Using hierarchial concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 182-186
g1,g7,g9

Francis, R. (1987). Drawing together teaching methods and strategies into a model for science education. Research in Science Education 17, 175-181
g1,g7

Fraser, K., Edwards, J. (1987). Concept maps as reflectors of conceptual understanding. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 187-192
g5,g7

Freyberg, P., Osborne, R. (1985). Assumptions about teaching and learning. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 82-90
g1,g7

Gil, P.D. (1987). Differences entre "modeles spontanes", modeles enseignes et modeles scientifiques: quelques implications didactiques. In: Giordan, A., Martinand, J.L.: Modeles et simulation. Actes des 9. journees int. sur l'ed. scient. Chamonix: Centre Jean Franco, 118-121
g1,g7

Giordan, A. (1988). From the categorization of learners' conceptions to an optimal didactic environment. Paper presented by the International Union of Biological Sciences, Comission for Biological Education
g1,g7

Glynn, S.M., Britton, B.K., Semrud-Clikeman, M. (1987). Analogical reasoning and problem solving in science textbooks. In: Glover, J.A., Ronning, R.R., Reynolds, C.R.: Handbook of creativity: assessment, research and theory. New York: Plenum
g1,g7

Griffiths, A.K., Thomey, K., Cooke, B., Normore, G. (1986). Remediation of student-specific misconceptions relating to three science concepts. St. John's, Newfoundland, Canada: Memorial University of Newfoundland
g7

Grimellini Tomasini, N., Pecori Balandi, B. (1983). Pupils' conceptions: Some implications for teachers training. Research on Physics Education. Proceedings of the first international workshop. La Londe les Maures, 479-488
g7

Gunstone, R.F., Northfield, J.R. (1986). Learners - teachers - researchers: Consistency in implementing conceptual change. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g1,g7

Gunstone, R.F., White, R.T. (1986). Assessing understanding by means of venn diagrams. Science Education 70, 2, 151-158
g5,g7

Gurney, B.F. (1988). Conceptual change through negotiation. Paper presented at the annual meeting of the Canadian Society of Education, Windsor, Ontario
g7

Gurney, B.F. (1989). A constructivist perspective on preservice science education. Paper presented at the annual meeting of the Canadian Society of Education, Quebec City
g7,g9

Happs, J.C. (1984). Harnessing alternative frameworks in teacher training: An example from the earth sciences. Research in Science Education 14, 167-172
g6,g7

Happs, J.C. (1985). Cognitive learning theory and classroon complexity. Research in Science and Technological Education 3, 2, 159-174
g6,g7

Häusling, A. (1986). Was heißt eigentlich Sachlernen ? Sachunterricht und Mathematik in der Primarstufe 14, 7, 7
g1,g4,g7

Henningsen, J. (1972). Wer lehrt, popularisiert. In: Henningsen, J.: Kommunikation zwischen Fußnote und Feuilleton. Weinheim: Beltz, 66-73
g7

Hesse, J. (1989). From naive to knowledgeable. The Science Teacher 56, 4, 55-58
g7

Hewson, G.M., Kriel, J.R., Zietsman, A.L. (1985). The restructuring of classical textbook knowledge for problem solving: A conceptual change approach. Johannesburg: National Institute for Personnel Research
g7

Hewson, P.W., Thorley, N.R. (1989). The conditions of conceptual change in the classroom. International Journal of Science Education 11, 541-553
g1,g7

Jung, W. (1986). Alltagsvorstellungen und das Lernen von Physik und Chemie. Naturwissenschaften im Unterricht - Physik/Chemie 34, 13, 2-6
g1,g7

Klima, R. (1974). Methoden und Ergebnisse der Analyse von Lernzielsequenzen im naturwissenschaftlichen Unterricht. In: Dahncke, H.: Zur Didaktik der Physik und Chemie. Hannover: Schroedel, 168-176
g7

Klopfer, L.E (1983). Intelligent tutoring systems in science education. The coming generation of computer-based instructional programs. Journal of Computers in Mathematics and Science Teaching 5, 4, 16
g1,g7

Krajcik, J.S., Lunetta, V.N. (1987). A research strategy for the dynamic study of students' concepts using computer simulation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 297-301
g7

Kuhn, C., Aguirre, J. (1987). A case study an the "journal method", a method designed to enable the implementation of constructivist teaching in the classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 262-274
g1,g5,g7

Linn, M.C. (1986). Learning-more with computers as lab partners. Berkeley, San Francisco: University of California
g7,T

Lochhead, J. (1983). Beyond Emile - misconceptins for education in the twenty-first century. Paper presented at the annual meeting of the American Educational Research Association, Montreal
g1,g7

McCasland, M. (1987). Engagement in learning, resistance to schooling: some implication of conceptual teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 311-321
g7,GEN

Milkent, M.M. (1977). It's time we started paying attention to what students don't know. Science Education 61, 409-413
g7

Minstrell, J., Smith, C. (1983). Alternative conceptions and a strategy for change. Science and Children 21, 3, 31-33
g7

Mitchell, F., Baird, J.R. (1986). Teaching, learning and the curriculum: The influence of content in science. Research in Science Education 16, 141-149
g7

Niedderer, H. (1988). Schülervorverständnis und historisch-genetisches Lernen mit Beispielen aus dem Physikunterricht. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Vorträge auf der Tagung für Didaktik der Physik/Chemie, September 1987 in Nürnberg. Alsbach: Leuchtturm, 76-107
G1,G7

Northfield, J., Gunstone, R.F. (1985). Understanding learning at the classroom level. Research in Science Education 15, 18-27
g1,g7

Novak, J.D. (1989). The use of metacognitive tools to facilitate meaningful learning. In: Adey, P.: Adolescent development and school science. London: Falmer Press, 227-239
g7

Novak, J.D., Gowin, D.B. (1984). Learning how to learn. Cambridge: Cambridge Univerity Press
g1,g5,g7

Novak, J.D., Symington, D. (1982). Concept mapping for curriculum development. V.I.E.R. Bulletine 48, 3-11
g1,g7

Nussbaum, J., Novick, S. (1981). Brainstorming in the classroom to invent a model: A case study. School Science Review 62, 221, 771-778
g7

Osborne, J., Squires, D. (1987). Learning science trough experiental software. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 373-380
g7

Osborne, R. (1984). Childrens' dynamics. The Physics Teacher 22, 504-508
g7,M

Osborne, R., Freyberg, P. (1985). Roles for the science teacher. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 91-99
g1,g7

Osborne, R., Tasker, R. (1985). Introducing children's ideas to teachers. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 136-148
g1,g7

Peard, T.L. (1983). The microcomputer in cognitive development research. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 112-126
g7

Rowell, J.A., Dawson, C.J. (1985). Equilibration, conflict and instruction: A new class-oriented perspective. European Journal of Science Education 7, 331-334
g1,g7

Sieben, G. (1987). Introducing concept mapping in the day to day science curriculum. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 436-446
g7

Simmons, P.E. (1987). Misconceptions of experts and novices during a genetics computer simulation. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 447-451
g7

Simpson, M. (1985). Diagnostic assessment and its contribution to pupils' learning. In: Brown, S., Munn, P.: The changing face of education 14 to 16: curriculum and assessment. NFER-Nelson, 69-81
g1,g7

Stavy, R. (n.d.). Using analogy to overcome misconceptions about conservation of matter. Accepted for publication J.R.S.T.
g7

Stavy, R., Cohen, M. (1989). Overcoming students' misconceptions about conservation of matter by conflict training and by analogical reasoning. Paper presented at the Jerusalem Conference
g7

Tasker, R., Freyberg, P. (1985). Facing the mismatches in the classroom. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland: Heinemann, 66-80
g1,g7

Thiel, S. (1970). Kinder sprechen über Naturphänomene. Die Grundschule
g7

Thiel, S. (1971). Modellvorstellung und Wirklichkeit. Neue Sammlung 11, 508-517
g7

Thiel, S. (1973). Grundschulkinder zwischen Umgangserfahrung und Naturwissenschaft. In: Wagenschein, M., Banholzer, A., Thiel, S.: Kinder auf dem Wege zur Physik. Stuttgart: Klett, 90-179
g7

Thompson, C.L. (1989). Discrepant events: What happens to those who watch ? School Science and Mathematics 89, 1, 26-29
g7

Van Oers, B. (1988). Modellen en de ontwikkeling van het (natuur-) wetenschappelijk denken van leerlingen. Tijdrschrift voor Didactiek der β-wetenschappen 6, 2, 115-143
g1,g7

West, L. (1985). Concept mapping. Paper prepared for the symposium "Perspectives on Cognitive Structure and Conceptual Change" at the annual meeting of the American Educational Research Association, Chicago
g5,g7

Wierstra, R.F.A. (1980). Psychological theories and research methods relating to pupils' mental structures as aids in designing a curriculum. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 377-381
g7

g8 UNTERSUCHUNGEN ZU VORSTELLUNGEN VON LEHRERN
INVESTIGATIONS OF TEACHERS' NOTIONS

Aguirre, J.M., Haggerty, S.M. (1990). Student teachers' conceptions of science, teaching and learning: A case study in preservice education. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Ameh, C.O. (1986). Common sense answers in physics. Research in Science Education 16, 31-39
g6,g8

Ameh, C.O. (1987). An analysis of teachers' and their students' views of the concept "Gravity". Research in Science Education 17, 212-219
g6,g8,P,M,OCI

Ameh, C.O. (1987). Misconceptions in science amongst Nigerian science teachers and students. In: Riquarts, K.: Science and technology education and the qualilty of life. Kiel: IPN-Materialien, 321-330
g6,g8,P,E,M

Ameh, C.O., Gunstone, R.F. (1985). Teachers' concepts in science. Research in Science Education 15, 151-157
g6,g8,P,M,E,B

Ameh, C.O., Gunstone, R.F. (1986). Science teachers' concepts in Nigeria and Australia. Research in Science Education 16, 73-81
g6,g8,P,E,M,B

Ameh, C.O., Gunstone, R.F. (1988). The understanding held by Nigerian science teachers of some science concepts. Paper presented at the meeting of the American Educational Research Association, New Orleans
g8,P,M,E,B

Arzi, H.J. (1988). On energy in chocolate and yogurt, or: on the applicability of school science concepts to real life. Paper presented at the annual meeting of the American Educational Research Association. New Orleans
g6,g8,P,EN,B,OCI

Arzi, H.J., White, R.T., Fensham, P.J. (1987). Teachers' knowledge of science: An account of a longitudinal study in progress. Paper presented at the annual meeting of the American Educational Research Association, Washington D.C.
g8,CTL,OCI

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). A study of the importance of reflection for improving science teaching and learning. Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Francisco
g8,g9,CTL

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). Teaching and learning science in schools. A report of research in progress. Melbourne: Monash University
g8,g9,CTL

Baird, J.R., Mitchell, I.J. (1986). Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery
g1,g6,g8,g9,CTL

Benson, G.D. (1987). Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 59-66
g1,g6,g8,CSC

Bloom, J.W. (1989). Preservice elementary teachers' conceptions of science: science, theories and evolution. International Journal of Science Education 11, 4, 401-415
g8,B,CSC

Brickhouse, N.W. (1989). The teaching of the philosophy of science in secondary classrooms: case studies of teachers' personal theories. International Journal of Science Education 11, 4, 437-449
g8,CSC,OCI

Brickhouse, N.W., Bodner, G.M., Neie, V.N. (1987). Teachers beliefs about science and their influence on classrom practice. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 34-48
g8,CSC

Briscoe, C., Lorsbach, A.W., Tobin, K., LaMaster, S.U. (1990). The influence of teachers' personal epistemologies beliefs, and role metaphors on assessment practices. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL

Claudet, J.G., Ellett, C.D. (1990). Student learning, teacher use of teaching/learning empowerment metaphors and classroom robustness: An initial investigation. Paper presented to the SIG Study of learning environments at the meeeting of the American Educational Research Association, Boston
g8,CTL

Duit, R., Treagust, D.F., Lindauer, I., Joslin, P. (1990). Wie Naturwissenschaftslehrer Analogien im Unterricht verwenden - eine Untersuchung im Rahmen eines qualitativen Forschungsansatzes. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 305-307
g8,CTL

Enochs, L.G., Cabel, D.L. (1984). Preservice elementary teachers' conceptions of volume. School Science and Mathematics 84, 8, 670-680
g8,P,M

Feher, E., Rice, K. (1987). A comparison of teacher student conceptions in optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 108-117
g6,g8,P,O

Feher, E., Rice, K. (1988). Ein Vergleich optischer Vorstellungen von Lehrern und Schülern. physica didactica 15, 2, 3-20
g6,g8,P,O,OIM,OCI

Fischler, H. (1985). Didaktische Theorien und didaktisches Handeln. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 58-75
g1,g8,g9,CTL

Fischler, H. (1986). Schülervorstellungen und Lehrertheorien - Zum Programm einer Rekonstruktion subjektiver Theorien von Physiklehrern. physica didactica 13, 67-79
g1,g8,CTL

Fischler, H. (1988). Didaktische Theorien und didaktisches Handeln - zwei Welten? In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie 1987 in Nürnberg. Alsbach: Leuchtturm, 361-363
G8,CTL

Fischler, H. (1988). Handlungsorientierung von Physiklehrern. physica didactica 15, 1, 43-63

g8,CTL

Fischler, H. (1989). Orientations of the actions of physics teachers. International Journal of Science Education 11, 2, 185-193

g8,CTL

Fraser, B.J., Rennie, L.J. (1988). Learning in science qualitative and quantitative investigations in year 10 classrooms. Research in Science Education 18, 227-235

g8,CTL

Gallagher, J.J. (n.d.). Research on secondary school science teachers' practices, knowlegde, and beliefs: A basis for restructuring. 43-57

g8,g9,CTL

Gorodetzky, M., Gussarsky, E. (1987). The role of students and teachers in misconceptualisation of aspects in chemical equilibrium. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 187-193

g6,g8,C

Gurney, B.F. (1990). Tugboats and tennis games: Preconceptions of teaching and learning through metaphor. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia

g8,CTL,OCI

Hashweh, M.Z. (1986). Effects of subject-matter knowledge in the teaching of biology and physics. Paper presented at the symposium "Examing the role of subject-matter knowledge in teaching", Annual Meeting of the American Educational Research Association

g8,P,M,B,CTL

Heller, P. (1987). Use of core propositions in solving current electricity problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 225-235

g6,g8,P,E

Hesse, J.J. (1987). The costs and benefits of using conceptual change teachings methods: a teachers' perspective. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 194-210

g1,g8,CTL

Hesse, J.J., Anderson, C.W. (1990). A case study of conceptual change teaching: Teaching the necessity of conservation in physical and chemical changes. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta

g7,g8,C,OCI,CTL

Hewson, P.W., Hewson, M.G. (1987). Identifying conceptions of teaching science. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 182-193

g8,CTL

Hewson, P.W., Hewson, M.G. (1987). Science teachers' conceptions of teaching: implications for teacher education. International Journal of Science Education 9, 4, 425-440

g8,CTL,g9

Hewson, P.W., Hewson, M.G. (1988). Analysis and use of a task for identifying conceptions of teaching science. Paper presented at the annual meeting of the American Education Research Association, New Orleans

g8,CTL,CSC,OCI

Johnston, K. (1987). Changing teacher's conceptions of teaching and learning. Paper prepared for BERA conference on teachers' professional learning at the university of Lancaster
g8,CTL

Jungwirth, E. (1988). The associate field as a diagnostic instrument in assessing the breadth of multi-contextual concepts: the concept "development". International Journal of Science Education 10, 5, 571-579
g5,g6,g8,B

Kirkwood, V., Carr, M., Bell, B., McChesney, J., Osborne, R., Symington, D. (1986). LISP (Energy): The strategy and some preliminary findings. Hamilton, N.Z.: University of Waikato
g7,g8,P,EN

Kirkwood, V., Carr, M., Gibb, S., Shaw, J., Stonyer, J. (1988). Teachers' interactions with LISP (energy) research. Working paper (No.310) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,g8,EN,P,CTL,CSC

Kirkwood, W., Bearlin, M., Hardy, T. (n.d.). How do toasters really work ? or mum is not dumb after all. School of Education, Canberra College of Advanced Education
g8,g9,CTL,CSC

Koulaidis, V., Ogborn, J. (1989). Philosophy of science: an empirical study of teachers' views. International Journal of Science Education 11, 2, 173-184
g8,CSC

Kruger, C. (1990). Some primary teachers' ideas about energy. Physics Education 25, 86-91
g6,g8,P,EN,OCI

Kruger, C., Summers, M. (1988). Primary School teachers' understanding of science concepts. Journal of Education for Teaching 14, 3, 259-265
g8,P,M,EN

Kruger, C., Summers, M. (1988). Some Primary School teachers' understanding of the concepts force and gravity. Oxford: Oxford University Department of Educational Studies
g8,P,M,OCI

Kruger, C., Summers, M. (1989). An investigation of some primary teachers' understanding of changes in materials. School Science Review 71, 255, 17-27
g8,P,AT,M,T,C,OCI

Kruger, C., Summers, M. (1990). A survey of Primary School teachers' conceptions of force and motion. Educational Research 32, 2, 83-94
g8,P,M

Lawrenz, F. (1986). Misconceptions of physical science concepts among elementary school teachers. School Science and Mathematics 86, 8, 7
g8

Lederman, N.G., Zeidler, D.L. (1987). Science teachers' conceptions of the nature of science: do they really influence teaching behavior ? Science Education 71, 5, 721-734
g8,CSC

Mohapatra, J.K., Bhattacharyya, S. (1989). Pupils, teachers, induced incorrect generalization and the concept of "force". International Journal of Science Education 11, 4, 429-436
g6,g8,P,M,OCI

Muralidhar, S. (1988). Solid water is denser than liquid water: Students' experiences of science lessons in Fiji. Research in Science Education 18, 276-282
g6,g8,P,M,AT

Nachtigall, D. (1981). The pre-Newtonian concept of motion in the minds of students. Paper presented at the Conference on Methods of Teaching Physics, 11.- 13. November 1981, Khom Kaen University, Thailand
g6,g8,P,M,OCI

Ogunniyi, M.B., Pella, M.O. (1980). Conceptualizations of scientific concepts, laws, and theories held by Kwara State, Nigeria Secondary School Science Teachers. Science Education 64, 5, 591-599
g8,CSC

Parsons-Chatman, S. (1990). Making sense of constructivism in preservice: A case study. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Proper, H., Wideen, M.F., Ivany, G. (1988). World view projected by science teachers: A study of classroom dialogue. Science Education 72, 5, 547-560
g8,CSC

Roberts, D.A., Chastko, A.M. (1990). Absorption, refraction, reflection: An exploration of beginning science teacher thinking. Science Education 74, 2, 197-224
g8,g9,CTL,OCI

Rollnick, M., Rutherford, M. (1990). African Primary School teachers - what ideas do they hold on air and air pressure ? International Journal of Science Education 12, 1, 101-113
g8,P,M,OCI

Russell, T., Johnston, P. (1988). Teachers learning from experiences of teaching: Analyses based on metaphor and reflection. Paper presented at the meeting of the American Educational Research Association, New Orleans, April 5-9, 1988. Session 12.19, "Teacher Reflection on Practice"
g8,CTL

Schaefer, G. (1983). Der Begriff Ökosystem in den Köpfen von Schülern und Lehrern. Verhandlungen der Gesellschaft für Ökologie. Band XI, 351-359
g6,g8,B

Schall, V.T., Jurberg, P., Boruchovitch, E., Felix-Sousa, I.C., Rozemberg, B., Vasconcellos, M.C. (1987). Health education for children, developing a new strategy. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 390-403
g6,g7,g8,B

Smith, D.C. (1987). Primary teachers' misconceptions about light and shadows. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 461-476
g8,P,O

Strömdahl, H., Tullberg, A., Lybeck, L. (1988). Chemistry educators' conceptions of 1 mol. In: Schmidt, H.J.: Proceedings of the International seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 109-128
g8,C

Tobin, K., Espinet, M., Byrd, S.E., Adams, D. (1988). Alternative perspectives of effective science teaching. Science Education 72, 4, 433-451
g8,CTL

Trumbull, D.J. (1990). Perspectives on teaching introductory biology (to which pre-service teachers might be exposed). Paper presented at the annual meeting of the American Educational Research Association, Boston
g8,CTL

Tullberg, A., Strömdahl, H., Lybeck, L. (1988). Chemistry educators' conceptions of how to teach "The Mole". In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 129-155
g8,CTL

Veiga, M.L., Costa Pereira, D.J., Maskill, R. (1989). Teachers' language and pupils' ideas in science lessons: Can teachers avoid reinforcing wrong ideas ? International Journal of Science Education 11, 4, 465-479
g8,P,T,EN,OCI

Zietz, K. (1937). Kindliche Erklärungsversuche für Naturerscheinungen. Zeitschrift für pädagogische Psychologie 38, 219-228
g6,g8,OCI

Zietz, K. (1937). Physikalische Theorien bei Kindern. Bericht über den XV. Kongreß der Deutschen Gesellschaft für Psychologie, Jena, 232-238
g5,g6,g8,ORC

Zietz, K. (1938). Das physikalische und technische Denken des Kindes. Bayerische Lehrerzeitung 12, 180-184
g6,g8,P,OCI

g9 VORSTELLUNGEN UND LEHRERBILDUNG
NOTIONS AND TEACHER TRAINING

Anderson, C.W., Belt, B.L., Gamalski, J.M., Greminger, J.E. (1987). A social constructivist analysis of classroom science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 11-24
g1,g5,g9

Baird, J.R. (1989). Intellectual and methological imperatives for individual teacher development. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g9

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). A study of the importance of reflection for improving science teaching and learning. Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Francisco
g8,g9,CTL

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). Teaching and learning science in schools. A report of research in progress. Melbourne: Monash University
g8,g9,CTL

Baird, J.R., Mitchell, I.J. (1986). Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery
g1,g6,g8,g9,CTL

Baird, J.R., Mitchell, I.J., Northfield, J.R. (1987). Teachers as researchers: The rationale, the reality. Research in Science Education 17, 129-138
g1,g9

Cohen, M.R. (1987). Interview studies in teacher education. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 74-75
g9

Fischler, H. (1985). Didaktische Theorien und didaktisches Handeln. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 58-75
g1,g8,g9,CTL

Flick, L. (1987). Preservice teachers conduct structured interviews with children to improve instructional methods. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 133-137
g9

Fowler, T.W., Bou Jaoude, S. (1987). Using hierarchical concept/proposition maps to plan instruction that addresses existing and potential student misunderstandings in science. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 182-186
g1,g7,g9

Gallagher, J.J. (n.d.). Research on secondary school science teachers' practices, knowlegde, and beliefs: A basis for restructuring. 43-57
g8,g9,CTL

Gunstone, R.F., Northfield, J.R. (1988). Inservice education: Some constructivist perspectives and examples. Paper presented at the meeting of the American Educational Research Association, New Orleans
g9

Gunstone, R.F., Northfield, J.R. (1988). Inservice education: Some constructivist perspectives and examples. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g9

Gunstone, R.F., Slattery, M., Baird, J.R. (1989). Learning about learning to teach: A case study of pre-service teacher education. Paper presented at the annual meeting of the American Educational Resaerch Association, San Francisco
g9

Gurney, B.F. (1989). A constructivist perspective on preservice science education. Paper presented at the annual meeting of the Canadian Society of Education, Quebec City
g7,g9

Hewson, P.W., Hewson, M.G. (1987). Science teachers' conceptions of teaching: implications for teacher education. International Journal of Science Education 9, 4, 425-440
g8,CTL,g9

Hills, G.L., McAndrews, B. (1987). David Hawkins critical barriers and the education of elementary school science teachers. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 210-223
g1,g2,g9

Jones, B. (1987). Primary School teacher education and alternative conceptions in science. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 233-238
g9

Kirkwood, V., Carr, M. (1988). "A most valuable growing exercise". A report on the interaction of teachers with the action-research phase. Research in Science Education 18, 95-103
g7,g9,P,EN

Kirkwood, W., Bearlin, M., Hardy, T. (n.d.). How do toasters really work ? or mum is not dumb after all. School of Education, Canberra College of Advanced Education
g8,g9,CTL,CSC

Kuehn, C., McKenzie, D.L. (1987). Finding out what kids know or "straight from the horse's mouth". In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 260-261
g9

MacKinnon, A.M. (1987). Toward a conceptualization of a reflective practicum in science teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 301-315
g9

Nachtigall, D. (1990). What is wrong with physics teachers' education ? European Journal of Physics 11, 1-14
g9

Northfield, J.R. (1988). School experience in preservice education: Examining some assumptions. Research in Science Education 18, 236-243
g9

Northfield, J.R. (1989). Constructing the practicum experience. Paper presented at the annual meeting of the American Educational Reseach Association, San Francisco
g9

Pope, M. (1989). The construing teacher. In: Kriesel, P., Lichtfeld, M.: Physikunterricht im Spannungsfeld zwischen Natur- und Erziehungswissenschaften. Berlin: Freie Universität. Zentralinstitut für Fachdidaktiken, 96-101
g1,g9

Richardson, M. (1987). Teachers as learners: images from the past and implications of a (generative) constructivist perspective for the future. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 378-389
g1,g9

Roberts, D.A., Chastko, A.M. (1990). Absorption, refraction, reflection: An exploration of beginning science teacher thinking. Science Education 74, 2, 197-224
g8,g9,CTL,OCI

Thomaz, M.F., Gilbert, J.K. (1989). A model for constructivist initial physics teacher education. International Journal of Science Education 11, 1, 35-47
g9

Tobin, K. (1989). Metaphor as a basis for conceptualizing teaching roles. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
g9

White, R.T., Baird, J.R., Mitchell, I.J., Fensham, P.J., Gunstone, R.F. (1989). Teaching and learning science in schools: An exploration of process. Paper presented at the annual meeting of the American Educational Reseach Association, San Francisco
g9

CTL UNTERSUCHUNGEN ZU VORSTELLUNGEN DES LEHR- UND LERNPROZESSES
STUDIES INVESTIGATING CONCEPTIONS OF TEACHING AND LEARNING

Aguirre, J.M., Haggerty, S.M. (1990). Student teachers' conceptions of science, teaching and learning: A case study in preservice education. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Arzi, H.J., White, R.T., Fensham, P.J. (1987). Teachers' knowledge of science: An account of a longitudinal study in progress. Paper presented at the annual meeting of the American Educational Research Association, Washington D.C.
g8,CTL,OCI

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). A study of the importance of reflection for improving science teaching and learning. Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Francisco
g8,g9,CTL

Baird, J.R., Fensham, P.J., Gunstone, R.F., White, R.T. (1989). Teaching and learning science in schools. A report of research in progress. Melbourne: Monash University
g8,g9,CTL

Baird, J.R., Mitchell, I.J. (1986). Improving the quality of teaching and learning - an Australian case study. Melbourne: The Monash University Printery
g1,g6,g8,g9,CTL

Briscoe, C., Lorsbach, A.W., Tobin, K., LaMaster, S.U. (1990). The influence of teachers' personal epistemologies beliefs, and role metaphors on assessment practices. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL

Carter, C., Bodner, G. (1987). How students' conceptions of the nature of chemistry and mathematics influence problem solving. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 69-83
g6,CTL,CSC

Claudet, J.G., Ellett, C.D. (1990). Student learning, teacher use of teaching/learning empowerment metaphors and classroom robustness: An initial investigation. Paper presented to the SIG Study of learning environments at the meeeting of the American Educational Research Association, Boston
g8,CTL

De Jong, E.J., Gunstone, R.F. (1988). A longitudinal classroom study of mechanics. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g5,g6,g7,P,M,CTL

Duit, R., Treagust, D.F., Lindauer, I., Joslin, P. (1990). Wie Naturwissenschaftslehrer Analogien im Unterricht verwenden - eine Untersuchung im Rahmen eines qualitativen Forschungsansatzes. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Probleme und Perspektiven. Vorträge auf der Tagung für Didaktik der Physik/Chemie in Kassel, September 1989. Alsbach: Leuchtturm, 305-307
g8,CTL

Fischler, H. (1985). Didaktische Theorien und didaktisches Handeln. In: Mikelskis, H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung zur Didaktik der Physik/Chemie. Alsbach: Leuchtturm, 58-75
g1,g8,g9,CTL

Fischler, H. (1986). Schülervorstellungen und Lehrertheorien - Zum Programm einer Rekonstruktion subjektiver Theorien von Physiklehrern. physica didactica 13, 67-79
g1,g8,CTL

Fischler, H. (1988). Didaktische Theorien und didaktisches Handeln - zwei Welten? In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie. Vorträge auf der Tagung für Didaktik der Physik/Chemie 1987 in Nürnberg. Alsbach: Leuchtturm, 361-363
G8,CTL

Fischler, H. (1988). Handlungsorientierung von Physiklehrern. physica didactica 15, 1, 43-63
g8,CTL

Fischler, H. (1989). Orientations of the actions of physics teachers. International Journal of Science Education 11, 2, 185-193
g8,CTL

Fraser, B.J., Rennie, L.J. (1988). Learning in science qualitative and quantitative investigations in year 10 classrooms. Research in Science Education 18, 227-235
g8,CTL

Gallagher, J.J. (n.d.). Research on secondary school science teachers' practices, knowlegde, and beliefs: A basis for restructuring. 43-57
g8,g9,CTL

Gunstone, R.F. (1988). Some long-term effects of uniformed conceptual change. Paper presented at the annual meeting of the American Educational Research Association, New Orleans
g7,P,M,CTL

Gunstone, R.F., Gray, R., Searle, P. (1987). Conceptual change: is it of value if students are ignorant of it ? Research in Science Education 17, 149-155
g7,P,M,CTL

Gurney, B.F. (1990). Tugboats and tennis games: Preconceptions of teaching and learning through metaphor. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,OCI

Gustafson, B.J. (1990). Children's changing conceptions. Paper presented to the 18th Annual Conference of the Canadian Society for the Study of Education, Victoria, British Columbia
g6,CTL,OCI

Haggerty, S.M. (1990). Student teachers' conceptions of science, of teaching and of learning: A progress report. London, Canada: University of Western Ontario
g6,CTL,CSC,OCI

Hallden, O. (1988). Alternative frameworks and the concept of task. Cognitive constraints in pupils' interpretations of teachers' assignments. Scandinavian Journal of Educational Research 32, 123-140
g6,CTL

Hammer, D. (1990). Metaknowledge in introductory physics. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,CSC,CTL,OCI

Happs, J.C., Stead, K. (1989). Using the repertory grid as a complementary probe in eliciting student understanding and attitudes towards science. Research in Science & Technological Education 7, 2, 207-220
g5,g6,CTL,OCI

Hashweh, M.Z. (1986). Effects of subject-matter knowledge in the teaching of biology and physics. Paper presented at the symposium "Examing the role of subject-matter knowledge in teaching". Annual Meeting of the American Educational Research Association
g8,P,M,B,CTL

Hesse, J.J. (1987). The costs and benefits of using conceptual change teachings methods: a teachers' perspective. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 194-210
g1,g8,CTL

Hesse, J.J., Anderson, C.W. (1990). A case study of conceptual change teaching: Teaching the necessity of conservation in physical and chemical changes. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta
g7,g8,C,OCI,CTL

Hewson, P.W., Hewson, M.G. (1987). Identifying conceptions of teaching science. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 182-193
g8,CTL

Hewson, P.W., Hewson, M.G. (1987). Science teachers' conceptions of teaching: implications for teacher education. International Journal of Science Education 9, 4, 425-440
g8,CTL,g9

Hewson, P.W., Hewson, M.G. (1988). Analysis and use of a task for identifying conceptions of teaching science. Paper presented at the annual meeting of the American Education Research Association, New Orleans
g8,CTL,CSC,OCI

Hollingsworth, S. (1989). Prior beliefs and cognitive change in learning to teach. American Educational Research Journal 26, 2, 160-189
g10,CTL

Johnston, K. (1987). Changing teacher's conceptions of teaching and learning. Paper prepared for BERA conference on teachers' professional learning at the university of Lancaster
g8,CTL

Kirkwood, V., Carr, M., Gibb, S., Shaw, J., Stonyer, J. (1988). Teachers' interactions with LISP (energy) research . Working paper (No.310) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,g8,EN,P,CTL,CSC

Kirkwood, W., Bearlin, M., Hardy, T. (n.d.). How do toasters really work ? or mum is not dumb after all. School of Education, Canberra College of Advanced Education
g8,g9,CTL,CSC

Lonka, K., Joram, E., Bryson, M. (1990). Students' changing conceptions of knowledge and learning. Poster presented at annual meeting of the American Educational Research Association, Boston MA
g6,CTL

Parsons-Chatman, S. (1990). Making sense of constructivism in preservice: A case study. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Posner, G.J., Strike, K.A. (1989). The conceptual ecology of physics learning. A poster session for presentation at the annual meeting of the American Educational Research Association, San Francisco
g6,P,M,O,CTL,CSC,GEN

Roberts, D.A., Chastko, A.M. (1990). Absorption, refraction, reflection: An exploration of beginning science teacher thinking. Science Education 74, 2, 197-224
g8,g9,CTL,OCI

Russell, T., Johnston, P. (1988). Teachers learning from experiences of teaching: Analyses based on metaphor and reflection. Paper presented at the meeting of the American Educational Research Association, New Orleans, April 5-9, 1988. Session 12.19, "Teacher Reflection on Practice"
g8,CTL

Shapiro, B.L. (1989). What children bring to light: Giving high status to learners' views and actions in science. Science Education 73, 6, 711-733
g5,g6,P,O,CSC,CTL,OCI

Sneider, C., Kurlich, K., Pulos, S., Friedman, A. (1984). Learning to control variables with model rockets: a neo-Piagetian study of learning in field settings. Science Education 68, 463-484
g6,GEN,CTL

Sumfleth, E. (1985). Zur Problematik der quantitativen Auswertung von erweiterten Paar-Beziehungs-Tests. chimica didactica 11, 197-216
g6,C,OCI,CTL

Sutton, C., West, L. (1982). Investigating children's existing ideas about science. A research seminar
g1,g6,CTL

Tan, S.K. (1987). A conceptualisation of students' meaning of understanding of physics in the high school classroom. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 491-500
g6,CTL

Tasker, R. (1981). Children's views and classroom experiences. The Australian Science Tachers Journal 27, 3, 33-37
g1,g6,CTL

Tobin, K., Espinet, M., Byrd, S.E., Adams, D. (1988). Alternative perspectives of effective science teaching. Science Education 72, 4, 433-451
g8,CTL

Trumbull, D.J. (1990). Perspectives on teaching introductory biology (to which pre-service teachers might be exposed). Paper presented at the annual meeting of the American Educational Research Association, Boston
g8,CTL

Tullberg, A., Strömdahl, H., Lybeck, L. (1988). Chemistry educators' conceptions of how to teach "The Mole". In: Schmidt, H.J.: Proceedings of the international seminar "Empirical Research in Science and Mathematics Education". Dortmund: University of Dortmund, 129-155
g8,CTL

Watts, M., Ebbutt, D. (1988). Sixth-formers' views of their science education, 11-16. International Journal of Science Eduaction 10, 2, 211-219
g6,CTL

CSC UNTERSUCHUNGEN VON VORSTELLUNGEN ÜBER DIE "NATUR" DER WISSENSCHAFTEN
STUDIES INVESTIGATING CONCEPTIONS OF SCIENCE

Aguirre, J.M., Haggerty, S.M. (1990). Student teachers' conceptions of science, teaching and learning: A case study in preservice education. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Benson, G.D. (1987). Open-endness in the empirical analytic mode: one conception of scientific progress. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 59-66
g1,g6,g8,CSC

Bethge, T. (1988). Aspekte des Schülervorverständnisses zu grundlegenden Begriffen der Atomphysik - Eine empirische Untersuchung in der Sekundarstrufe II. Bremen: Universität Bremen
g1,g6,P,Q,AT,EN,CSC

Bloom, J.W. (1989). Preservice elementary teachers' conceptions of science: science, theories and evolution. International Journal of Science Education 11, 4, 401-415
g8,B,CSC

Brickhouse, N.W. (1989). The teaching of the philosophy of science in secondary classrooms: case studies of teachers' personal theories. International Journal of Science Education 11, 4, 437-449
g8,CSC,OCI

Brickhouse, N.W., Bodner, G.M., Neie, V.N. (1987). Teachers beliefs about science and their influence on classrom practice. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 34-48
g8,CSC

Carter, C., Bodner, G. (1987). How students' conceptions of the nature of chemistry and mathematics influence problem solving. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 69-83
g6,CTL,CSC

Ellerton, N.F., Ellerton, H.D. (1987). Mathematics and chemical problems created by students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 131-136
g5,g6,C,CSC

Flick, L. (1990). Scientist in Residence Program. Improving children's image of science and scientists. School Science and Mathematics 90, 3, 204-214
g6,CSC,OIM,GEN

Haggerty, S.M. (1990). Student teachers' conceptions of science, of teaching and of learning: A progress report. London, Canada: University of Western Ontario
g6,CTL,CSC,OCI

Hammer, D. (1990). Metaknowledge in introductory physics. Paper presented at the annual meeting of the American Educational Research Association, Boston
g6,CSC,CTL,OCI

Härtel, H. (1990). Lernen und Verstehen physikalischer Konzepte: Bericht über eine Untersuchung in den Jahren 1988-89. Kiel: IPN an der Universität Kiel
g5,g6,P,M,CSC,GEN

Hesse, J.J., Anderson, C.W. (n.d.). Students' conceptions of chemical change. Journal of Research in Science Teaching, in press
g6,C,CSC,OCI

Hewson, P.W., Hewson, M.G. (1988). Analysis and use of a task for identifying conceptions of teaching science. Paper presented at the annual meeting of the American Education Research Association, New Orleans
g8,CTL,CSC,OCI

Kirkwood, V., Carr, M., Gibb, S., Shaw, J., Stonyer, J. (1988). Teachers' interactions with LISP (energy) research. Working paper (No.310) of the Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,g8,EN,P,CTL,CSC

Kirkwood, W., Bearlin, M., Hardy, T. (n.d.). How do toasters really work ? or mum is not dumb after all. School of Education, Canberra College of Advanced Education
g8,g9,CTL,CSC

Koulaidis, V., Ogborn, J. (1989). Philosophy of science: an empirical study of teachers' views. International Journal of Science Education 11, 2, 173-184
g8,CSC

Lederman, N.G. (1990). Students' perceptions of the nature of science: assessment, development, and sources of change. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g6,CSC,OCI

Lederman, N.G., O'Malley, M. (1990). Students' perceptions of tentativeness in science: development, use, and sources of change. Science Education 74, 2, 225-239
g5,g6,CSC,OCI

Lederman, N.G., Zeidler, D.L. (1987). Science teachers' conceptions of the nature of science: do they really influence teaching behavior ? Science Education 71, 5, 721-734
g8,CSC

Niedderer, H. (1987). Alternative frameworks of students in mechanics and atomic physics.Methods of research and results. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 335-348
g6,g7,P,M,Q,CSC

Niedderer, H. (1989). Qualitative and quantitative methods of investigating alternative frameworks of students - With results from atomic physics and other subject areas. Paper presented to the annual meeting of the American Association of Physics Teachers. American Association for the Advancement of Science
g5,g6,P,Q,CSC

Noce, G., Vincentini-Missoni, M. (n.d.). Investigations on the common sense knowledge of adults: Gravity and light. unpublished
g6,P,M,O,CSC

Ogunniyi, M.B., Pella, M.O. (1980). Conceptualizations of scientific concepts, laws, and theories held by Kwara State, Nigeria Secondary School Science Teachers. Science Education 64, 5, 591-599
g8,CSC

Parsons-Chatman, S. (1990). Making sense of constructivism in preservice: A case study. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia
g8,CTL,CSC,OCI

Posner, G.J., Strike, K.A. (1989). The conceptual ecology of physics learning. A poster session for presentation at the annual meeting of the American Educational Research Association, San Francisco
g6,P,M,O,CTL,CSC,GEN

Proper, H., Wideen, M.F., Ivany, G. (1988). World view projected by science teachers: A study of classroom dialogue. Science Education 72, 5, 547-560
g8,CSC

Rubba, P.A., Horner, J.K., Smith, J.M. (1981). A study of two misconceptions about the nature of science among Junior High School students. School Science and Mathematics 81, 3, 221-226
g6,CSC,GEN

Shapiro, B.L. (1989). What children bring to light: Giving high status to learners' views and actions in science. Science Education 73, 6, 711-733
g5,g6,P,O,CSC,CTL,OCI

STS UNTERSUCHUNGEN ZU VORSTELLUNGEN VOM NUTZEN NATURWISSENSCHAFTLICHER KENNTNISSE IN TECHNIK UND GESELLSCHAFT

STUDIES INVESTIGATING CONCEPTIONS OF THE USE OF SCIENCE FOR TECHNOLOGY AND SOCIETY

Aikenhead, G.S. (1987). High school graduates beliefs about Science-technology-society. III. Characteristics and limitations of scientific knowledge. Science Education 71, 4, 459-487
g6,STS,GEN

Barbieri, G., Mosconi Bernardini P., Gagliardi, R. (1988). Les presentations en ecologie: Un moyen pour aborder l'interdisciplinarite dans l'education a l'enviroment. In: Giordan, A., Martinand, J.L.: Communication, education et culture scientifiques et industrielles. 279-285
g6,sts

Brody, M.J. (1987). A programmatic approach to teaching and learning about students understanding of science and natural resource concepts related to environmental issues. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 67-80
g6,g7,STS

Brody, M.J. (1990). Fourth, eighth and eleventh grade students' understanding of pollution. Paper presented at the annual meeting of the National Association of Research in Science Teaching, Atlanta
g6,STS

Eijkelhof, H.M.C., Klaassen, C.W.J.M., Lijnse, P.L., Scholte, R.L.J. (1990). Perceived incidence and importance of lay-ideas on ionizing radiation: Results of a Delphi-Study among radiation-experts. Science Education 74, 2, 183-195
g6,P,AT,STS

Fleming, R. (1988). Undergraduate science students' views, on the relationship between science, technology and society. International Journal of Science Education 10, 4, 449-463
g6,STS,SCS,OCI

Happs, J.C. (n.d.). Constructivism and subjectivity in adult decision-making about water quality. Paper presented at the 12th annual conference of the Western Australian Science Education Association, University of Western Australia 1986
g6,STS

Klaassen, C.W.J.M., Eijkelhof, H.M.C., Lijnse, P.L., Scholte, R.L.J. (1988). Leerlingen over Tsjernobyl. Tijdschrift voor Didactiek der β-wetenschappen 6, 3, 199-219
g6,P,STS

Rennie, L.J., Sillitto, F. (1988). The meaning of technology: Perceptions from the essays of year 8 students. The Australian Science Teachers Journal 34, 4, 68-76
g6,STS,GEN

Rice, P., Gunstone, R.F. (1986). Health and sickness causation and the influence of Thai culture among Thai schoolchildren. Research in Science Education 16, 63-72
g6,B,STS,OCI,GEN

Ringnes, V. (1987). Misconceptions in environmental chemistry among Norwegian students. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 415-421
g6,C,STS

Ronen, M., Ganiel, U. (1988). From assumption of knowledge to knowledgeable considerations: a class activity on "ionizing radiation and its biological effects". International Journal of Science Education 10, 5, 523-529
g6,P,STS

Sarr, M. (1988). Quelques conceptions de jeunes saheliens sur la protection de la nature. In: Giordan, A.; Martinand, J.L.: Communication, education et culture scientifiques et industrielles. Dixiemes Journees Internationales sur l'Education Scientifique, 273-277
g6,sts

Schaefer, G. (n.d.). Empirical studies on concept formation. The concept of "Energy" and "Health" in West-German schools. Hamburg: University of Hamburg
g6,P,B,EN,STS

Schaefer, G. (1980). Der Beitrag des Biologieunterrichts zur Entwicklung eines Energiebewußtseins. Vortrag auf der MNU/SIL-Tagung "Weltproblem Energie" 9. - 11.3.1980 in Koblenz
g6,P,EN,STS,OCI

Schaefer, G. (1980). The concept of "Health" and "Environment" in future biology teaching. Proceedings of the Eights Biennial Conference of AABE
g6,B,STS

Scharf, V., Brinkmann, H., Overkamp, M. (1982). Rückgewinnung von Stoffen. Ein Schlüsselprozeß für den Unterricht, dargestellt an einer Modellreaktion. Naturwissenschaften im Unterricht - Physik/Chemie 30, 6, 219-223
g6,C,STS,OCI

Stilwell, S., Brody, M. (1987). Cross cultural analysis of student understanding of marine science and natural resource concepts related to the gulf of Maine. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 490-498
g6,B,STS

GEN UNTERSUCHUNGEN, IN DENEN GESCHLECHTSSPEZIFISCHE UNTERSCHIEDE ERFORSCHT WERDEN
STUDIES, IN WHICH GENDER DIFFERENCES ARE INVESTIGATED

Aikenhead, G.S. (1987). High school graduates beliefs about Science-technology-society. III. Characteristics and limitations of scientific knowledge. Science Education 71, 4, 459-487
g6,STS,GEN

Bach, S. (1988). Schülerprognosen über Mischungstemperaturen. In: Wiebel, K.H.: Zur Didaktik der Physik und Chemie: Vorträge auf der Tagung für Didaktik der Physik/Chemie, September 1987 in Nürnberg. Alsbach: Leuchtturm, 287-289
G6,P,T,GEN

Bezzi, A. (1989). Geology and Society: a survey on pupils' ideas as an instance of a broader prospect for educational research in Earth Science. Paper presented at the 28th International Geological Congress held in Washington D.C.
g6,GEN

Bouwens, R.E.A. (1987). Misconceptions among pupils regarding geometrical optics. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconception and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 23-38
g6,P,O,GEN

Flick, L. (1990). Scientist in Residence Program. Improving children's image of science and scientists. School Science and Mathematics 90, 3, 204-214
g6,CSC,OIM,GEN

Härtel, H. (1990). Lernen und Verstehen physikalischer Konzepte: Bericht über eine Untersuchung in den Jahren 1988-89. Kiel: IPN an der Universität Kiel
g5,g6,P,M,CSC,GEN

Jimenez Aleixandre, M.P., Fernandez Perez, J. (1987). Selection or adjustment ? Explanations of university biology students for natural selection problems. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.II. Ithaca: Cornell University, 224-238
g6,B,GEN

Jones, B., Lynch, P.P., Reesink, C. (1987). Children's conceptions of the earth, sun and moon. International Journal of Science Education 9, 1, 43-53
g6,P,AS,GEN

Kirkwood, V., Carr, M., Newman, B. (1988). Energy in New Zealand Secondary School junior science classrooms - a trial unit. Working paper (No.308) of the Learning in Science Project, Science Education Research Unit, University of Waikato, Hamilton N.Z.
g7,P,EN,OCI,GEN

Lazarowitz, R. (1981). Correlations of Junior High School students' age, gender and intelligence with ability to construct classification in biology. Journal of Research in Science Teaching 18, 1, 15-22
g6,B,GEN

Lazarowitz, R., Meir, O. (1988). High School students' questions in biology: Cognitive levels and content themes. Research in Science Education 18, 9-21
g6,B,GEN

Lightman, A.P., Miller, J.D., Leadbeater, B.J. (1987). Contemporary cosmological beliefs. In: Novak, J.: Proceedings of the 2. Int. Seminar "Misconceptions and Educational Strategies in Science and Mathematics", Vol.III. Ithaca: Cornell University, 309-321
g6,P,AS,GEN

Maloney, D.P. (1988). Novice rules for projectile motion. Science Education 72, 4, 501-513
g6,P,M,GEN

Mayer, M. (1987). Common sense knowledge versus scientific knowledge: the case of pressure, weight and gravity. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 299-310
g2,g6,P,AS,M,GEN

McCasland, M. (1987). Engagement in learning, resistance to schooling: some implication of conceptual teaching. In: Novak, J.: Proceedings of the 2. Int. Seminar Misconceptions and Educational Strategies in Science and Mathematics, Vol.I. Ithaca: Cornell University, 311-321
g7,GEN

Münzinger, W. (1989). "Wenn Bl[illegible]nstanden ist, dann ist es Reduktion von Bleioxid". chimica didactica 1[illegible], 5-25
g5,g6,C,GEN

Nöding, S. (1969). Was stellen sich die Schüler der Unter- und Mittelstufe unter einem Atom vor ? Der mathematische und naturwissenschaftliche Unterricht 22, 365-367
g6,P,AT,GEN,OCI

Osborne, R., Gilbert, J.K. (1980). A technique for exploring students' views of the world. Physics Education 15, 6, 376-379
g5,GEN,OCI

Posner, G.J., Strike, K.A. (1989). The conceptual ecology of physics learning. A poster session for presentation at the annual meeting of the American Educational Research Association, San Francisco
g6,P,M,O,CTL,CSC,GEN

Rennie, L.J., Sillitto, F. (1988). The meaning of technology: Perceptions from the essays of year 8 students. The Australian Science Teachers Journal 34, 4, 68-76
g6,STS,GEN

Rice, P., Gunstone, R.F. (1986). Health and sickness causation and the influence of Thai culture among Thai schoolchildren. Research in Science Education 16, 63-72
g6,B,STS,OCI,GEN

Rowell, J.A., Renner, V.J. (1976). Quantity conceptions in university students: Another look. British Journal of Psychology 67, 1-10
g6,P,M,GEN

Rubba, P.A., Horner, J.K., Smith, J.M. (1981). A study of two misconceptions about the nature of science among Junior High School students. School Science and Mathematics 81, 3, 221-226
g6,CSC,GEN

Ryman, D. (1977). Teaching method, intelligence and gender factors in pupil achievment on a classification task. Journal of Research in Science Teaching 14, 401-409
g7,B,GEN

Schaefer, G., Joppien, S., Plickat, A. (1986). Teachers' and students' reaction to and concept of a computer in West-Germany. Paper presented to the international seminar "The Use of Computers in Biology Education", Helsinki, Finland, Report published in 1987 through IUBS
g6,P,GEN

Schecker, H. (1984). Das Verständnis zentraler Begriffe der klassischen Mechanik bei Schülern der 11. Jahrgangsstufe. Bremen: Universität Bremen
g6,P,M,GEN,OCI

Shipstone, D.M. (1984). A study of children's understanding of electricity in simple DC circuits. European Journal of Science Education 6, 185-188
g6,P,E,GEN,OCI

Shipstone, D.M. (n.d.). A study of secondary school pupils' understanding of current, voltage and resistance in simple DC circuits. Nottingham: University of Nottingham, School of Education
g6,P,E,GEN,OCI

Sneider, C., Kurlich, K., Pulos, S., Friedman, A. (1984). Learning to control variables with model rockets: a neo-Piagetian study of learning in field settings. Science Education 68, 463-484
g6,GEN,CTL

Solomon, J. (1987). The pupils' view of electricity revisited: social development or cognitive growth ? International Journal of Science Education 9, 1, 13-22
g6,GEN

Tiberghien, A., Delacote, G. (1976). Manipulation et representations de circuits electrique simples chez des enfants de 7 a 12 ans. Review Francaise de Pedagogie 34, 32-44
g6,P,E,OIM,GEN,OCI

AUTORENVERZEICHNIS

Die Zahlen im folgenden Register weisen auf die Seiten hin, auf denen Artikel des betreffenden Autors genannt sind.

AUTHORS' INDEX

The figures in the following list indicate the pages on which articles of the referring authors are to be found.

A

Aalst, H.V. 66,164
Abdel-Wahab, M.C. 123
Abdeljabbar, M. 190
Abdullah, K.B. 154
Abimbola, I.O. 2
Abraham, M.R. 98,111,133
Ackermann, K. 78
Adams, D. 200,208
Adams, S. 66
Adeniyi, E.O. 139
Adey, P. 2
Aebli, H. 2
Aguirre, J.M. 19,57,84,123,124,193,196
 205,209
Aiello-Nicosia, M.L. 123
Aikenhead, G.S. 154,212,214
Aissen-Crewett, M. 2
Alanach, D. 181
Albaladejo, C. 139
Albert, E. 2,78
Albrecht, E. 42
Allen, J. 185
Allen, R.D. 2
Allin, A.C. 154
Altes, A.S. 84
Alvarez, M.C. 49,190
Alvermann, D.E. 170,172
Ameh, C.O. 66,84,139,154,196
Amir, R. 49,90,139
Anadon, M. 2
Anamuah-Mensah, J. 2,129,134
Anderson, C.W. 2,49,81,104,105,110,133
 139,140,142,149,176,178,186,187,198
 202,207,210
Anderson, J. 5,86,170
Anderson, M. 181
Anderson, N.H. 36
Anderson, R.D. 154
Andersson, B.R. 2,66,78,84,104,110,129
 154,178,185
Andersson, J.A. 104
Angus, J.W. 139
Appleton, K. 78
Arca, M. 3
Archenhold, W.F. 84
Arimoto, N. 174
Arnaudin, M.W. 34,139,148,190
Arnold, B. 31,100,114,121,122,150,178
 182,187,189
Arnold, M. 164
Arons, A.B. 84,170,183
Arzi, H.J. 49,118,129,139,196,205
Asher, R.C. 152
Askham, L.R. 139
Aufschnaiter, S. 3,66
Augustoni, M. 149
Ault, C.R. 3,49,104,110
Auman, J. 141
Ausubel, D.P. 3
Avrams, R. 59,81

B

Bach, S. 42,78,214
Bailey, J. 123
Bain, D. 65
Baird, J.R. 14,84,118,154,193,196,202
 203,204,205
Banholzer, A. 123
Bar, V. 49,78,84,170
Barbetta, M.G. 85,118
Barbieri, G. 155,212
Barbour, B. 3
Barboux, M. 82
Barenholz, H. 187
Bargellini, A. 129
Barke, H.D. 129
Barker, M. 139,140,187
Barras, R. 140
Barrow, L.H. 123
Barth, N. 104
Barufaldi, J.P. 93
Barz, W. 49,123
Bassok, M. 13
Bauman, R.P. 66
Baxter, J. 115
Baydoun, E. 140
Bayer, H.J. 110
Bayrhuber, H. 11,54,131
Bearlin, M. 199,203,207,210
Behrend, D.A. 142
Beiswenger, R.E. 100,174

Bell, B. 8,25,42,49,79,140,182,187,199
Belt, B.L. 2,49,202
Ben-Zvi, R. 53,129,131
Benson, G.D. 3,155,196,209
Bentley, M.L. 11
Benyamna, S. 66,104,110
Berck, M. 104
Berge, O.E. 85,118
Bergerhoff, F. 59
Berkheimer, G.D. 110,178
Berkovitz, B. 82,168
Bernasconi, M. 143
Berni, T. 129
Bernstein, A.C. 140
Berzonsky, M.D. 140
Bessman, M. 36,41
Bethge, T. 3,110,118,183,209
Beveridge, M. 78
Bezzi, A. 155,214
Bhattacharyya, S. 96,199
Biddulph, F. 130,140,162,187,190
Billeh, V.Y. 140
Birdwhistel, R. 118,181
Bishop, B.A. 140
Black, D. 66
Black, P. 72,76,118,123,181
Blanco, A. 113,136
Bleichroth, W. 110,155
Bliss, J. 50,85,118,155,170,190
Bloom, J.W. 3,50,140,197,209
Blosser, P. 3
Blum, L.H. 141
Blumör, R. 50,104,105
Bocciola, M.T. 143
Bodner, G.M. 4,155,197,205,209
Boeha, B.B. 4,50,85,170
Boekaerts, M. 50
Böhme, G. 37,39
Borghi, L. 85,87
Bormann, M. 123
Born, G. 42,110,155
Boruchovitch, E. 150,189,200
Boschhuizen, R. 159
Boujaada, E. 187
BouJaoude, S.B. 11,130,191,202
Bouma, H. 130
Bouma, J. 159
Boundy, K. 152
Bouwens, R.E.A. 105,176,214
Bovet, M. 16
Bowbal, D. 148
Bowd, A.D. 141
Bowden, J.A. 50,61,85,98
Bowman, D. 56,146
Boyd, C.A. 155
Boyes, E. 4
Bradley, G. 130
Brady, C. 190
Brainerd, C.J. 4,31
Brämer, R. 123
Brand, K.-J. 78
Brandt, L. 130
Brauner, R. 67,78
Brewer, W.F. 117,180
Brickhouse, N.W. 197,209
Briggs, H. 79,110
Brinkmann, H. 136,213
Briscoe, C. 197,205
Britton, B.K. 13,192
Brody, M.J. 151,155,187,190,212,213
Brook, A. 79,110,118,140,181
Brook, V.G. 59,160
Bross Grzybowski, E. 98
Broudy, H.S. 4
Brown, A.L. 4
Brown, D.E. 85,86,170,174,190
Brown, G. 4
Browne, C.E. 80
Browning, M. E. 50,141
Bruhn, J. 4
Brumby, M.N. 141
Bryson, M. 160,207
Buchweitz, B. 67
Buck, P. 4,50,130
Buell, R.R. 130
Burashnikov, A.V. 85
Busch, T.V. 71
Buthig, W. 130
Butts, B. 50,130
Butts, W. 67
Byrd, S.E. 200,208

C

Cachapuz, A.F.C. 50,58,79,130,134,168 185
Cahn, A.D. 6,86
Caillot, M. 50,67
Calafate, L.C. 141
Calderhead, J. 51
Callsen, H. 172
Canay de Mendez, A.M. 147
Candy, P.C. 4
Caral, P. 141
Caramaza, A. 85
Caravita, S. 51,141
Carey, S. 4,39,41,127
Carr, M. 39,51,67,118,130,140,164,181 182,187,199,203,207,210,214
Carracosa, A.J. 12,39
Carteili, A. 98,99
Carter, C. 155,205,209
Casadio, C. 91,172
Case, R. 4
Cassels, J.R.T. 42
Castle, F. 85
Cauzinille-Marmeche, E. 155
Cazorla, F.N. 108
Cervellati, R. 130
Chaiklin, S. 29
Chalouhi, E. 5,50,67
Champagne, A.B. 5,6,14,51,86,110,131 170,172
Charles, D.C. 147
Chastko, A.M. 200,204,208
Chastrette, M. 110,131
Chayoth, R. 56,146
Chi, M.T.H. 6
Chipman, H.H. 45,160
Cho, H.H. 141,188
Clamann, Y.H. 142
Claudet, J.G. 197,205
Claus, J. 105,109,176
Claxton, G.L. 6
Cleare, C. 190
Clement, J. 6,39,51,69,85,86,134,155 170,171,174,175,190
Clinchy, B. 6
Clivaz, P. 154
Closset, J.L. 67,164
Cobern, W. 6
Cochaud, G.A.M. 51
Coddington, M. 121
Cohen, M.R. 67,155,164,194,202
Cole, H. 87
Coles, B. 6
Colins, A. 87,142,151,162
Colinvaux, D. 88
Collins, A. 110,189
Confrey, J. 6,51
Conn, J.H. 142
Consoli, V. 141
Contento, I. 142
Cooke, B. 181,185,188,192
Cosgrove, M. 7,51,67,87,97,164,191
Costa Pereira, D.J. 201
Cowan, P.A. 140
Cox, D.L. 92
Crawley, F.E. 19
Cros, D. 110,111,131
Cross, R.T. 87,171
Curran, T.E. 92

D

Dahlgren, L.O. 155
Dahlmann, W. 111
Dahncke, H. 51,87,119
Dale, M. 151
Dall'Alba, G. 50,61,85,98,168
Danusso, L. 67
Daumenlang, K. 123
Davidson, D. 142
Davidson, J. 181
Dawson, C.J. 7,29,87,98,173,194
De Ambrosis, A. 85,87
De Bueger-Van der Borght, C. 119,131 142
De Carcer, I.A. 7
De Jong, E.J. 51,87,171,205
De Jong, T. 68
De Lannoy, J. 97,121
De Vecchi, G. 115,144
De Vos, W. 41,138
Deadman, J.A. 142

Dekkers, J. 7,191
Delacote, G. 52,77,80,82,106,108,216
Delorme, A. 87
Deluca, F.P. 156
Deneby, J.A. 142
Denicolo, P. 60
Dennis, W. 149,156
Deno, T. 96
Dentici, O.A. 87
Desautels, J. 2,7,20
Desena, A.T. 5
Desforges, C. 4
Di Sessa, A.A. 7,68,88,191
Dibar Ure, C.M. 88
Dickie, L.O. 88
Dierks, W. 178,185
Dinter, K. 78
Dolgin, K.G. 142
Donovan, M.P. 2
Doran, R.L. 156
Dow, A. 181
Dreyfus, A. 7,37,142
Driver, R. 7,8,23,52,79,88,89,110,111
118,119,131,143,156,168,181,191
Drozd, L. 42
Dubay, J. 187
Dudeck, W.-G. 72,164
Dufresne, R. 101,170
Duit, R. 8,9,39,42,43,51,52,66,68,79,87
88,89,92,119,120,121,124,164,165,197
205
Duncan, I.M. 131
Dunn, C.S. 52,190
Dunne, M. 36,41
Dupin, J.J. 68,70,76,165
Dupre, F. 67,89,98,99,115
Duschl, R.A. 9,39,58
Dyche, S. 100,151,174,189
Dykstra, D. 9

E

Easley, J.A. 8
Easley, J.R. 9,10,52,156
Eaton, J.F. 105,142,176
Ebbutt, D. 163,208
Ebinghaus, H. 71
Eckstein, S.G. 89
Edwards, J. 54,191
Eger, M. 10
Ehlert, M. 111,131
Eigenstetter-Bösl, E. 70,81,92
Eijkelhof, H.M.C. 111,124,125,159,212
Eisen, Y. 143,188
Ekeland, P. 94
Ellerton, H.D. 52,131,209
Ellerton, N.F. 52,131,209
Ellett, C.D. 197,205
Elliot, G.S. 59,160
Elsom, B. 153
Enge, M. 94
Engel Clough, E. 79,89,143,168
Engelhardt, P. 18,53,79,89,93,124,171
176
Engström, Y. 143
Ennenbach, W. 183,188
Enochs, L.G. 197
Erätuuli, M. 79
Erickson, G.L 8,10,52,53,58,79,112,123
124,146,168,188
Erle, G. 68
Escant, A. 108
Esgalhado, A. 105
Espinet, M. 200,208
Evans, J.D. 143
Ewing, A.M. 131
Eylon, B.-S. 53,67,68,69,89,129,131

F

Faletti, J. 188
Fallon, A.E. 143,149
Faucher, G. 10,68,89
Fayol, M. 110,131
Fedra, D. 30,37,80,120
Feher, E. 53,68,105,108,176,197
Feldsine, J.E. 53,89,131,171,185
Felix-Sousa, I.C. 150,189,200
Feltovich, P.J. 6
Fensham, P.J. 10,12,14,35,43,64,84,118
131,157,196,202,204,205
Ferguson-Hessler, M. 68
Fernandez Perez, J. 146,214
Fetherstonhaugh, A.R. 53,105,106,176

Fetherstonhaugh, T. 106,176
Fillbrand, H. 66
Finegold, M. 115,177,183
Finley , F.N. 53,80,156
Fischbein, E. 39,89,90
Fischer, H.E. 3,10,53,69,165
Fischler, H. 10,183,197,198,202,206
Fisher, K.M. 10,11,143,188
Fladt, R. 131
Flavell, J.H. 11
Fleming, R. 156,212
Fleshner, E.A. 90
Flick, L. 156,202,209,214
Forman, G. 53,171
Fowler, T.W. 11,191,202
Francis, R. 11,123,191
Frankl, D.R. 49,139
Fraser, B.J. 198,206
Fraser, K. 54,191
Fredette, N.H. 54,69,171
Freenor, E. 180
Freitas, M. 137,150
Frey, K. 11,54,131
Freyberg, P. 11,25,33,42,49,60,187,191
  194,195
Friedler, Y. 90
Friedman, A. 162,208,216
Fritsch, L. 111,131
Fuchs, H.M. 30
Fujita, G. 174
Fuller, R.G. 11
Furio Mas, C.J. 37,39,90,111,132
Fuschini, E. 90

G

Gabel, D.L. 7,111,197
Gagliardi, M. 99
Gagliardi, R. 120,143,147,154,155,188
  212
Gal-Choppin, R. 152
Galiardi, R. 156,189
Gallagher, J.J. 11,198,202,206
Gallo, M. 129
Gamalski, J.M. 2,49,202
Gamble, R. 90
Gandolfi, E. 91,171
Ganiel, M. 67
Ganiel, U. 68,69,89,126,165,171,213
Gans, A. 21
Gardner, P.L. 43,90
Gardosh, R. 94
Garnett, P.J. 46,60,69,132,135,156,185
Garrard, J.E. 11,35,54,64,141
Garrison, J.W. 11
Gartley, W. 143
Gater, S. 181
Gates, L. 156
Gauld, C.F. 11,12,39,69,165
Gayford, C.G. 120
Gellert, E. 143
Gelman, R. 144
Genet, M.F. 120
Genin, C. 124,183
Gennaro, E.D. 90,132
Gentner, D. 69,76,87,110
George, J. 43,144,156,157
Gerace, W. 101,171
Gerlach, W. 43
Gertzog, W.A. 27,61
Gervais, H. 96
Ghiglionne, R. 108
Giami, S. 25
Giani, U. 162
Gibb, S. 182,199,207,210
Giese, P.A. 90
Gil, P.D. 12,37,39,191
Gilbert, J.K. 12,26,27,47,54,60,61,69,80
  90,102,106,111,120,122,132,144,157
  203,215
Gilbert, J.R. 54,70
Gillespie, J.P. 144
Giordan, A. 12,13,22,40,54,124,132,144
  157,183,185,188,192
Gipper, H. 43
Glaser, R. 6,13
Glaserfeld, E. von 13
Glasgow, J. 43,144,156,157
Glatzel, D. 135
Gliner, G.S. 54
Gloriozov, P.A. 132
Glynn, S.M. 13,103,192
Göbel, R. 13,44
Goffman, E. 13

Gohmert, B. 165
Goldberg, F.M. 54,106,177
Goldman, J.D. 144
Goldman, R.J. 144
Gongora, J.A. 157
Good, R. 13
Göritz, J. 124
Gorodetsky, M. 54,55,90,132
Gott, R. 70
Gowin, D.B. 13,24,49,60,110,194,198
Graf, D. 55,145
Graham, I. 145
Grandy, R.E. 13
Grant, B.A. 145
Granville, M.F. 80,120
Gray, R. 172,206
Green, B. 85
Green, P. 114,179
Greeno, J.G. 14
Greminger, J.E. 2,49,202
Griffin, H.C. 121,134
Griffiths, A.K. 145,185,188,192
Griffiths, K.M. 145,157,181
Grimellini Tomasini, N. 80,90,91,130
168,171,172,192
Grob, K. 29,70,74,166
Grossi, M.C. 87
Grossi, M.G. 85
Grosslight, L. 174
Grützmann, F. 111,132
Guesne, E. 8,55,80,106,156,177,191
Guidoni, P. 3,14,37
Gunstone, F.G. 6
Gunstone, R.F. 5,6,14,23,36,51,55,66,84
86,87,91,112,118,134,139,149,167,170
171,172,192,193,196,202,203,204,205
206,212,215
Gurevich, A.E. 85
Gurney, B.F. 192,198,203,206
Gussarsky, E. 54,55,132,198
Gustafson, B.J. 157,206

H

Hackling, M.W. 132,145
Hafner, B. 151
Hagemeister, V. 80
Haggerty, S.M. 157,196,205,206,209
Hagstedt, H. 55,157
Hague, S.A. 170
Haidar, A.H. 111,133
Halbwachs, F. 34,41,86,110,131
Hall, G.S. 80
Hall, J.R. 133
Hallden, O. 14,145,157,206
Halloun, J.A. 91
Hamida, J.B. 70
Hamlyn, D. 37,80
Hammer, D. 157,206,209
Hammer, H.D. 185
Hand, B.M. 185,186
Haney, R.E 55,145
Hannaway, O. 44
Hänsel, H. 111,133
Happs, J.C. 55,105,106,113,136,145,157
158,162,176,188,192,207,212
Hardiman, P.T. 171
Hardy, T. 199,203,207,210
Harel, G. 91
Harlen, W. 99,158
Härtel, H. 55,91,165,210,214
Hartfree, W.E. 14
Hashweh, M.Z. 14,55,91,198,207
Haslam, F. 152
Hauke, B. 70,85,118,165
Haupt, G.W. 124
Haupt, P. 133
Haury, D.L. 25,161
Häusler, K. 136
Häusling, A. 14,44,192
Häußler, B. 32
Häußler, P. 14
Hawkins, D. 15
Hawkins, J. 15
Hayes, J.R. 15,31
Head, J.O. 15,55
Hedewig, R. 145
Heege, R. 15,40,44,70,162
Heepmann, B. 158
Heidenreich, R. 91
Heinrich, P. 112
Heinze-Fry, J.A. 188
Heisenberg, W. 44
Heisl, W. 104

Heller, B. 44
Heller, P. 70,198
Helm, H. 15,55,124,158
Henckell, H. 15
Hendrick, K. 146
Henle, P. 44
Henningsen, J. 192
Hernandez, D. 140
Hernandez, J. 39,90,111,132
Herron, J.D. 15,133,186
Hesse, J.J. 15,133,186,192,198,207,210
Hestenes, D. 91
Hewson, M.G. 15,16,37,44,80,91,172,192 198,203,207,210
Hewson, P.W. 16,27,55,91,124,172,175 192,198,203,207,210
Hibbard, K.M. 111
Hickman, F.M. 146
Hilbert, M. 124
Hildebrand, A.C. 146
Hill, D. 123,158
Hills, G.L. 16,37,44,55,203
Hilscher, H. 70,81,92
Hobbs, E.D. 146
Hodgson, G.H. 133
Hoffmann, K. 55,106,177
Hojnacki, S.K. 92
Holding, B. 16,40,112,133
Holla, E. 70
Hollingsworth, S. 207
Hollon, R.E. 81
Höpp, G. 44
Horner, J.K. 161,211,215
Howard, R.W. 16
Howe, A. 115
Hoz, R. 51,56,90,91,132,146
Huang, J. 158
Hübner, K. 44
Hughes, D. 181
Humboldt, W. von 44
Hunn, D. 111
Hurford, W. 101
Hynd, C.R. 170,172

I

Idar, J. 165,171
Inbody, D. 158
Inhelder, B. 16,26,158,159,161
Innocenti, E.D. 129
Isa, A.M. 56
Ivany, G. 200,211
Ivowi, U.M.O. 92,120,124

J

Jacobs, G. 158
Jaeckel, K. 16,78,91
Jaide, W. 159
Janetzki, V. 71
Janke, D.L. 142
Jay, B. 156
Jenelten-Allkofer, C. 11,54,92,120,131
Jenkins, E.W. 17
Jertson, D. 36,41
Jimenez Aleixandre, M.P. 146,214
Jochems, W. 56
Johansen, G.T. 60
Johansson, B. 17,56
Johnson, C.N. 146,153,159
Johnson, P.E. 92
Johnson-Laird, P.N. 34
Johnston, K. 199,207
Johnston, P. 200,208
Johnstone, A.H. 42,58,81,131,133,146
Johsua, S. 68,70,71,76,165
Jones, A.T. 92
Jones, B. 92,115,203,214
Jones, G. 101,174
Jones, O.E. 82,101
Joppien, S. 127,215
Joram, E. 160,207
Jordaan, A.S. 17
Jordan, J. 71
Joslin, P. 197,205
Jung, C.G. 17
Jung, W. 9,17,18,37,40,44,50,51,53,55,56 57,68,71,76,79,89,92,93,104,105,106 107,120,164,165,166,172,178,181,193
Jungwirth, E. 7,57,142,146,159,199
Jurberg, P. 150,189,200

K

Kagan, M.H. 155
Kahle, J.B. 141,188
Kahn-Gandapur, T.H. 59
Kainz, F. 44,45
Kamlah, W. 45
Kane, B. 146
Kanner, L. 142
Kargbo, D.B. 146
Kariotoglou, P. 93
Karmiloff-Smith, A. 159
Karplus, R. 159
Kärrquist, C. 57,71,76,104,107
Kass, H. 10,43,93,138
Kaup-Hartog, G. 45,133
Keating, D.P. 18
Keil, F.C. 151
Kelly, P.J. 142
Kempa, R.F. 18,57,133
Kendall, D.C. 148
Kenealy, P. 45,93
Kennedy, M.H. 146
Kent, D. 181
Kesidou, S. 40,57,79,81,120
Khan-Gandapur, T.H. 160
Kim, C.-J. 93
King, W.H. 159
Kinnear, J.F. 146,188
Kiowski, I. 71,166
Kipman, D. 169
Kircher, E. 71,93,112
Kirkwood, V. 118,181,182,199,203,207
210,214
Kitagawa, O. 45
Klaasen, C.W.J.M. 111,124,125,212
Klein, C.A. 115
Kleinman, R.W. 121,134
Klemmer, G. 134
Klima, R. 193
Klopfer, L.E 5,6,14,18,51,86,170,172,193
Kluwe, R. 32
Knaggs, J. 147
Knifong, J.D. 93
Knote, H. 112
Koballa, T.R. 19
Kohl, D. 95
Köhnlein, W. 19,21
Kojima, M. 45,96
Koliopoulos, D. 93,121
Königsberg Kerner, N. 121,134
Konold, C.E. 125
Koulaidis, V. 199,210
Koumaras, P. 73,166
Kovacs, L. 93
Krajcik, J.S. 57,193
Krause, H. 186
Kreitler, H. 147
Kreitler, S. 147
Kriel, J.R. 192
Kruger, C. 121,199
Krumm, B. 59
Kubli, F. 19,45,57,94,195
Kuehn, C. 162,203
Kuethe, L.J. 159
Kugbey, H.G.K. 134
Kuhn, C. 19,57,193
Kuhn, D. 159
Kuiper, J. 94
Künzli, R. 19
Kurlich, K. 162,208,216

L

La Rosa, C. 107
Labudde, P. 173
Lai, S. 61,126
LaMaster, S.U. 197,205
Lamb, C.E. 19
Lambert, P. 93
Lang, M. 11
Larkin, J.H. 19,20,57,94
Larochelle, M. 2,7,20
Laurillard, D. 50,61,85,98
Lawrenz, F. 199
Lawson, A.E. 20,147
Lawson, R.A. 94,121
Lazarowitz, R. 147,214
Leadbeater, B.J. 115,215
Leboutet-Barrel, L. 94
Lechner, H. 20
Lederman, N.G. 58,159,199,210
Lee, K.W. 58,134
Leeds, M.J. 147

Lefevre, R. 107,108
Lehmann, J.D. 50,141
Lehner, H. 20
Lehrke, M. 11,54,131
Levin, I. 94
Levine, S.H. 114
Licht, P. 58,71,72,76,159,166
Lichtfeldt, M. 125,183
Lie, S. 94,100
Lightman, A.P. 115,215
Lijnse, P.L. 111,123,124,125,175,212
Lin, H. 20,37
Lindauer, I. 197,205
Linder, C.J. 20,58,112,125
Linke, R.D. 125
Linn, M.C. 20,21,27,159,160,168,193
Lippert, R. 21
Lipson, J.F. 10,11
Llopis Castello, R. 45,134
Llorens Molina, J. 45,134
Loch, W. 45,46
Lochhead, J. 21,193
Lochhead, N. 69
Löffler, G. 21,94,112
Logan, P. 45
Longden, B. 147
Lonka, K. 160,207
Looft, W.R. 147
Lorenzen, P. 45
Loria, A. 85,118
Lorsbach, A.W. 197,205
Lott, G.W. 21
Lovell, K. 21,72,94,160
Lowell, W.E. 154
Lucas, A.M. 58,139
Lunetta, V.N. 57,193
Lunzer, E.A. 21
Luther, W. 45
Lybeck, L. 21,58,94,125,134,160,200 201,108
Lynch, P.P. 45,92,115,160,200,201,208
Lyndon, H. 29,173
Lythoth, J. 21,40,58

M

Ma-Naim, H. 39,89,90
Mabille, A. 119,131,142
MacGuire, P.R. 58
Machold, A. 125
MacKinnon, A.M. 203
Madrid, A.C. 108
Mahadeva, M.N. 21
Mahmoud, N.A. 146
Maichle, U. 22,58,72,165,166
Mali, G.B. 115
Malone, J. 7,191
Maloney, D.P. 22,58,94,95,125,160,183 215
Mandl, H. 101
Manghesi, L. 129
Mans, C. 98
Manthei, U. 81,95,121,126
Marcus, W. 178,186
Marek, E.A. 98,147,150
Marioni, C. 173
Martin, Ch. 154
Martin, E. 50,61,85,98
Martin, F.L. 147
Martin, M.D. 146
Martinand, J.L. 13,22,54,144
Martinez Oroz, C. 188
Martins, I.P. 130
Marton, F. 17,22,50,56,58,61,85,98,134 155
Mascellani, V. 85,118
Masillo, S. 162
Maskill, R. 50,56,58,79,130,134,168,185 201
Massara, C.I. 85,87
Masters, G.N. 22,50,52,61,85,98
Matalon, B. 108
Matthews, G.P. 59,160
Matthews, M.R. 40,45
Maurer, A. 147
Maurin, M. 111,131
Maurines, L. 95
Mayer, M. 22,37,95,107,115,160,215
Mazzoli, P. 3
McAndrews, B. 16,37,203
McCasland, M. 193,215
McChesney, J. 182,199
McClelland, J.A.G. 22,95,121
McCloskey, M. 40,85,95

McDermott, J. 20
McDermott, L.C. 54,72,80,81,94,95,101 106,121,126,127,166,168,173,177
McDonald, J.J. 81,133
McInerny, J.D. 145
McIntyre, P.J. 72
McKenzie, D.L. 203
McManus, P. 58
McNaught, C. 22,45
Medrano, F. 157
Megarity, M.T. 59,95
Mehegan, J. 87
Meheut, M. 37,86,110,131,134,155
Mehl, M.C. 22
Mehrle, U. 45
Mein, M.-T. 134
Meir, O. 147,214
Mellouk, B. 186
Mendez de Gagliardi, M. 147
Menge, S. 72,164,166
Menis, J. 135
Merce, M.M. 84
Merkle, D.G. 148
Merten, S. 38
Mestre, J. 23,101,171,183
Mibiol, K.S. 160
Michaud-Bonnet, J. 124,183
Michelini, M. 85,118
Milkent, M.M. 160,193
Millar, R. 23,164
Miller, J.D. 115,215
Minstrell, J. 96,173,193
Mintzes, J.J. 34,64,139,148,152,153,190
Mitchell, F. 193
Mitchell, I.J. 3,112,134,154,196,202,204 205
Mitzkat, H. 23
Mohapatra, J.K. 96,108,199
Monk, M. 50
Montcouquiol, A. 96
Montuschi, A. 130
Moore, J.E. 148
Moreira, M.A. 59,67,72,81
Morelli, M. 129
Mori, I. 45,96
Morrison, I. 85,118
Mosconi Bernadini, P. 143,155,156,212
Mothes, H. 23,160
Mullet, E. 96
Münzinger, W. 59,135,215
Muralidhar, S. 96,112,199
Murphy, P. 161
Murray, D.L. 96,148
Murray, T. 174

N

Nachmias, R. 59,81
Nachtigall, D. 23,96,129,173,200,203
Nagy, M.H. 59,148
Nagy, P. 59
Narode, R. 96
Naumer, H. 46
Nay, U. 46,135
Neie, V.N. 197,209
Neuberger, H.T. 161
Neuman, D. 22
Newman, B. 118,181,182,214
Nguyen-Lin, M. 144
Nicholls, C.E. 57
Nicholson, J.R. 112
Niedderer, H. 9,23,60,66,72,87,96,99 119,126,173,183,193,210
Niegemann, H.M. 23
Nielsen, H. 97,126
Noce, G. 89,97,108,115,148,210
Nöding, S. 112,215
Noel, D. 148
Nordland, F.H. 141,188
Normore, G. 181,185,188,192
Northfield, J.R. 3,14,23,192,193,202 203
Novak J.D. 15,23,24,49,60,97,110,111 116,158,161,188,193,194
Novick, S. 112,135,178,194
Nsumbu-A-Nlambu, D.M. 81
Nussbaum, J. 25,40,112,113,115,126,178 180,194
Nussionovitz, R. 152

O

O'Malley, M. 58,159,210
Oakes, M.E. 25,161

Ogar, J. 97,116
Ogborn, J. 25,50,60,85,97,118,173,190
199,210
Ogunniyi, M.B. 116,200,210
Okeke, E.A.C. 148
Oldham, V. 8,72,76
Olson, J. 25
Olstad, R.G. 25,161
Oludotun, J.S. 92,120
Ondrako, M.A. 140
Osborne, J. 194
Osborne, R. 7,11,12,25,26,49,51,54,60,63
67,70,73,76,87,90,97,100,108,113,130
135,157,162,164,166,167,173,178,182
186,190,191,194,199,215
Overkamp, M. 136,213
Oxenham, J. 39,130

P

Pacca, J.L.A. 91,127,172
Pachaury, A.C. 45,160
Padiglione, C. 135
Palacios, F.J.P. 108
Paoloni, L. 26
Parsons-Chatman, S. 26,161,200,207
210
Patrizi, P. 107
Pea, R.D. 15
Peard, T.L. 194
Pecori Balanda, B. 80,90,91,130,168
171,172,192
Pedrosa, M.A. 62
Pella, M.O. 126,135,140,200,210
Pellet, A. 124,183
Pereira, D. 58
Perez de Eulate, L. 189
Perkins, D.N. 26
Perugini, D. 130
Peters, A. 67
Peters, P.C. 73,97
Peterson, R.F. 46,60,135
Pfuhl Rodrigues, D.M.A. von 102,126
Pfundt, H. 9,11,18,46,54,113,131,135
178,186
Phelps, H. 159
Phinios, D. 112
Piaget, J. 16,26,40,41,97,121,126,161
Pinard, A. 87
Pines, L. 26,27,35,46,60
Pitkethly, A. 87,171
Placek, W.A. 97
Plickat, A. 127,215
Pliner, P. 143
Pollak, V. 70
Pope, M. 27,35,54,60,61,120,204
Popp, B.D. 80,168
Popp, R. 126
Porter, C.S. 149
Porter, J. 180
Posner, G.J. 27,32,33,60,61,97,108,208
211,215
Powell, D. 181
Prawat, R. 153
Preece, P.F.M. 27,41,61,73,98,116,161
Price, B. 181
Prieto, T. 113,136
Proper, H. 200,211
Prout, A. 149
Proverbio, E. 61,126
Prüm, R. 73
Psillos, D. 73,93,166
Pulos, S. 21,27,100,116,162,180,208,216
Pundak, D. 115

Q

Quiggin, V. 149
Quinn, L. 173

R

Raat, J. 101,174
Radford, T. 152
Rafel, J. 98
Raghubir, K.P. 27
Raichvarg, D. 144
Rainard, B. 57
Ramsden, P. 50,61,85,98
Rang, O. 46
Rankin, G. 84
Ranney, M. 173
Rapoport, A. 46,98
Raspe, C. 161

Rastilla, C. 141
Raven, R.J. 87,98
Rebordao, J. 105
Redden, M.G. 158
Redeker, B. 4,28,38
Reed, J.L. 28
Reesink, C. 92,115,214
Reichwein, A. 134
Reif, F. 28,173
Reimann, P. 32
Reiner, M. 177,183
Renner, J.W. 28,98,100
Renner, V.J. 98,215
Rennie, L.J. 161,198,206,212,215
Renström, L. 61,113,129,136,154
Resnick, L.B. 28,92
Reul, H. 18,92,172
Rhöneck, C. von 9,18,29,51,52,68,70,73
74,75,76,87,98,113,121,164,165,166
Riani, P. 129
Rice, K. 53,105,108,176,197
Rice, P. 149,212,215
Richardson, E. 126
Richardson, M. 29,204
Ridgeway, D. 61,98
Riechard, D.E. 149
Riesch, W. 49,113,123
Riley, M.S. 14,29,74
Ringnes, V. 136,213
Risco, V.J. 49,190
Roberts, D.A. 200,204,208
Robertson, W.W. 126
Rochel, J.-J. 154
Rodriguez, A. 113,135
Rogan, J.M. 61,168
Rogers, W.P. 161
Rollnick, M. 200
Ronen, M. 126,219
Roschelle, J. 173
Rosenquist, M.L. 81,95,126,168,173
Rosenthal, K. 6
Ross, B.H.B. 136
Ross, K.A. 29
Rossel, J.-D. 154
Rost, J. 29
Roth, C. 29
Roth, K.J. 149
Rouchier, A. 34,41
Rowell, J.A. 29,87,98,173,194,215
Rozemberg, B. 150,189,200
Rozier, S. 82,113
Rozin, P. 143,149
Rubba, P.A. 161,211,215
Ruggiero, S. 98,99
Rui de Vilar Correia, M. 149
Rumpf, H. 38
Rusca, G. 141
Russel, D.H. 29
Russel-Gebett, J. 149
Russell, R.W. 149
Russell, T. 99,200,208
Rutherford, M. 200
Ryman, D. 149,189,215

S

Sachsse, H. 38
Sadler, P.M. 115,116
Safler, G. 149
Säljö, R. 9,29
Saltiel, E. 41,99,134
Salyachivin, S. 99
Samuel, K.V. 111
Sanford, J.P. 149,189
Santos, C.A. 59,81
Sarr, M. 161,213
Scanlon, E. 8
Schaefer, G. 30,46,121,126,127,140,149
150,200,213,215
Schäfer, K. 30,99
Schall, V.T. 150,189,200
Scharf, V. 30,136,213
Schecker, H. 30,41,99,173,182,216
Schenk, B. 99,121,127
Scherpenzeel, L. 145,188
Schilder, P. 150
Schilling, P. 75,165
Schmidt French, B. 149,189
Schmidt, D. 3,30,75,166,167
Schmidt, H.J. 136
Schmidt-Wolbrandt, K. 75
Schofield, B. 161
Schollum, B. 119,135,136,178,186
Scholte, R.L.J. 111,125,212

Schön, L. 30,37,38,41
Schönherr, J. 99
Schroeder, S. 9
Schulte, W. 46,75,161
Schultz, K. 174
Schuster, D.G. 61
Schwaneberg, R. 70,162
Schwedes, H. 3,18,61,72,75,92,93,104
166,167,172
Scott, P. 113,178,179
Scriven, E.G. 162
Searle, P. 99,172,206
Sebald, D. 136
Sebastia, J.M. 30
Seddon, G.M. 62
Segre, G. 99,162
Seibicke, W. 42
Seiffert, H. 46
Selley, N.J. 113,137
Semrud-Clikeman, M. 13,192
Sen'ko, Iu.V. 30
Sequeira, M. 137,150
Sere, M.G. 37,55,99,155,174
Shafer, T. 190
Shankar, N. 99
Shanon, B. 41,100
Shapiro, B.L. 62,108,208,211
Sharodini-Dagan, N. 116,180
Shavelson, R.J. 62
Shaw, J. 182,199,207,210
Shayer, M. 2,30,31,82
Sheldon, T. 187
Shemesh, M. 89
Shepherd, D.L. 100
Shipstone, D.M. 75,76,167,216
Shrigley, R.L. 19
Shuell, T.J. 31,62
Shultz, T.R. 121
Sieben, G. 194
Siegel, L.S. 31
Siegler, R.S. 102
Siemsen, F. 108
Silberstein, J. 53,129,131
Sillitto, F. 161,212,215
Simeone, R. 143
Simeone, S. 143
Simmons, P.E. 57,194
Simmons, R. 26
Simon, D.P. 20
Simon, H.A. 15,20,31
Simpson, M. 31,100,114,121,122,150,178
182,187,189,194
Simpson, W.D. 150
Sinclair, H. 16
Singer, J. 89
Sjoberg, S. 94,100
Slack, S.J. 151
Slattery, M. 203
Sly, K. 36,41
Smedslund, J. 31
Smeets, P.M. 151
Smith, C.L. 116,117,127,174,193
Smith, D.C. 200
Smith, E.L. 21,31,104,105,139,142,149
176,187
Smith, J.M. 161,211,215
Smith, M.U. 151
Smith, R. 50,130
Sneider, C. 100,116,162,180,208,216
Snir, J. 174
Snively, G. 62,162
Solomon, C.A. 6,86
Solomon, J. 31,32,38,46,66,72,76,100
118,122,162,167,174,177,181,182,216
Solomonidou, C. 127,137
Spada, H. 32
Spees, S.T. 110,178
Sperandeo-Mineo, R.M. 123
Spreckelsen, K. 32,47,55,62,127,157,162
Springer, K. 151
Springfeld, U. 76
Squires, D.A. 5,194
Stachel, D. 100,137
Statkiewicz, W.R. 2
Staver, J.R. 7,32
Stavridou, H. 127,137
Stavy, R. 39,59,81,82,89,90,100,114,137
143,151,162,168,188,194
Stead, B. 108,122,151
Stead, K.E. 55,82,100,158,207
Stein, J.S. 169
Steinberg, M.S. 76,167
Stengl, D. 83
Stenhouse, D. 32,47

Stepans, J.I. 100,151,162,174,189
Stephanou, A. 50,61,85,98
Stevens, A.L. 162
Stewart, A.R. 137
Stewart, J. 32,53,62,151,189
Stilwell, S. 151,213
Stonyer, J. 182,199,207,210
Stork, E. 76,105,167,176
Stork, H. 41
Strack, D. 76,167
Strauss, M.J. 114
Strauss, S. 32,82,168
Streibel, M. 151,189
Strike, K.A. 27,32,33,97,108,208,211
  215
Strnad, J. 33
Strömdahl, H. 58,94,134,200,201,208
Strusberg, S. 143,148
Stuart, H.A. 62,72,76
Stückrath, F. 33,137
Styrz, I. 140
Suarez, A. 33
Subbarini, M.S. 151
Sujak-Lesz, K. 100
Sumfleth, E. 33,62,130,134,208
Summers, M. 199
Sundaru 108
Sutton, C. 15,33,47,55,62,162,208
Svensson, L. 17,56
Swan, M. 82,101
Swartz, C.E. 114
Swift, D.J. 12
Swingler, D.G. 156
Symington, D.J. 24,152,162,182,190,194
  199
Szekely, L. 33
Szeminska, A. 97

T

Tadang, N. 45,96
Tait, C.D. 152
Tamir, P. 33,49,63,64,90,139,152,163
  187
Tan, S.K. 163,208
Targan, D.S. 117,180
Tasker, R. 7,26,33,63,76,163,167,191
  194,195,208
Täubert, P. 81,95,121
Taylor, R. 152
Tema, B.O. 152
Templeton, B. 180
Tenney, Y. 76
Tergan, S.O. 101
Terpstra, K.J. 82,122
Terry, C. 101,174
Theman, J. 63
Thiel, S. 195
Thisjs, G.D. 101
Thomas, G. 58
Thomaz, M.F. 204
Thomey, K. 181,185,188,192
Thompson, C.L. 195
Thompson, J.J. 51
Thompson, L.D. 147
Thomsen, P.V. 97,126
Thorley, N.R. 16,76,101,167,174,192
Tiberghien, A. 8,33,37,55,73,76,77,79
  80,82,106,108,121,123,134,156,166
  168,191,216
Tisher, R.P. 163
Tobias, S.D. 63
Tobin, K. 156,197,200,204,205,208
Todtenhaupt, S. 137
Tolle-Herlyn, A. 77
Tolman, R.R. 152
Tomer, Y. 56,146
Tonucci, F. 51,141
Torosantucci, G. 97
Torracca, E. 135
Touger, J.S. 23,47,63,101,183
Treagust, D.F. 46,60,63,69,76,101,106
  116,117,132,135,137,145,148,152,167
  174,176,180,185,186,189,197,205
Treffer, R. 101
Triplett, G. 82
Trowbridge, D.E. 101
Trowbridge, J.E. 63,148,152
Trumbull, D.J. 200,208
Trumper, R. 182
Tschacher, W. 101
Tullberg, A. 58,94,134,200,201,208

U

Ueno, N. 174
Unger, C.M. 174

V

Vallassiades, O. 73,93
Van Damme, J. 101
van den Berg, E. 108
van den Berg, J. 101,174
Van Driel, J. 41,138
Van Hise, Y.A. 101,174
van Joolingen, W.R. 175
Van Oers, B. 34,195
van Sprang, H.F. 82,122
van't Hul, F.E. 175
Vanderlocht, M. 101
Vankirk, J. 60
Varela, M. 34
Vasconcellos, M.C. 150,189,200
Vecchi, G. de 13,40,54,124,132,183,185
189
Vegting, P. 34,101,184
Veiga, M.L. 201
Venz, M.I. 125
Verdonk, A.H. 41,82,122,138
Vergnaud, G. 34,41
Verkerk, G. 105,176
Vicentini-Missoni, M. 34,37,38,89,97,98
99,107,108,115,117,210
Viennot, L. 34,41,63,82,102,113,127,163
Viglietta, M.L. 117
Villani, A. 91,127,172
Voelker, A.M. 126,127,135,138,163
Voigt, J. 34
Völker, B. 74
Vollmer, G. 34,47
Volmink, J.D. 22
Von Hug-Hellmuth, H. 152
Voorde, H.H. ten 63,102,138,186
Vos, H. 123
Vosniadou, S. 117,180
Voss, H.P. 47,71,77
Vuilleumier, B. 82,102

W

Wachsmuth, J. 64
Wagenschein, M. 34,38,47
Wallace, J.D. 64
Walsh, E. 50,61,85,98
Wandersee, J.H. 34,41,64,153
Warren, J.W. 102,122
Warrington, L. 119
Wason, P.C. 34
Waterman, M.A. 35
Watt, D. 99
Watts, D.M. 47,54,90,102,103,122
Watts, M. 12,27,35,61,64,69,80,91
106,108,111,120,122,132,144,163
172,208
Wax, N. 151
Webb, G. 81,133
Weber, E. 71,165,166,172,181
Weber, K. 103
Weber, R. 42,155
Wechsler, D. 150
Weerda, J. 103,127,138
Weil-Barais, A. 155,174
Wein, H. 47,48
Weinert, F.E. 35
Weisgerber, L. 48
Weizsäcker, C.F. von 48
Welch, W.W. 122
Well-Barais, A. 33
Wellmann, H.M. 11,153,159
Wells, J. 103,138
Wells, P. 181
Wendelboe, B. 36,41
Weninger, J. 48
Wesley, W. 184
West L. 27,33,35,64,162,195,208
Westphal, W. 49,87,113,119,123
Wheeler, A.E. 35,122,138
Whitaker, R.J. 103
White, B. 103,175
Whitee, E. 153
White, J.E. 103
White, R.T. 5,14,35,36,55,84,86,91,118
152,192,196,202,204,205
Whitelock, D. 50,64,85,103
Whorf, B.L. 48
Wickihalter, R. 108

2508

Wideen, M.F. 200,211
Widl, M. 93
Wierstra, R.F.A. 195
Wiesner, H. 18,50,53,55,71,76,79,83,89 93,104,105,106,107,108,109,124,165 166,167,169,171,172,176,177,181
Wightman, T. 114,179
Wilkening, F. 36,103
Wilkinson, D. 77
Wille, J. 140
Williams, G.T. 140
Wiser, M. 41,127,169
Wittrock, M.C. 26,36
Wolff, R. 48
Wollman, W. 34
Wood-Robinson, C. 143,148
Wubbels, T. 109
Wylam, H. 82

Y

Yarroch, W.L. 138
Yates, J. 36,41
Young, D.B. 64

Z

Za'rour, G.I. 163
Zee, E.H. van 72,95,126,127,166
Zeidler, D.L. 199,210
Zelewski, H.D. von 89,120
Zeyer, G. 103
Zietsman, A. 86,175,192
Zietz, K. 36,64,127,128,163,201
Zimmermann, M.L. 65,83,169
Zohar, A. 152,163
Zoppi, D. 85
Zylberstajn, A. 90,103

ANHANG 1

In der folgenden Liste erscheinen die Publikationen in alphabetischer Reihenfolge, die während der Arbeit an der vorliegenden Auflage zwischen Oktober und Dezember 1990 aufgenommen worden sind.

APPENDIX 1

In the following publications that have been added to the bibliography during the preparation of the present edition from October to December 1990 are listed in alphabetical order.

ANHANG 1

APPENDIX 1

Andersson, B. (1990). Pupils' conceptions of matter and its transformations (age 12-16). In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 12-35
g6,P,AT,C

Appleton, K. (1989). A learning model for science education. Research in Science Education 19, 13-24
g1

Appleton, K., Hawe, E., Biddulph, F., Osborne, R. (1984). So you think the guide materials look good ! Research in Science Education 14, 206-212
g8,CTL

Barke, H.D. (1990). pH-neutral oder elektrisch neutral ? Über Schülervorstellungen zur Struktur von Salzen. Der mathematische und naturwissenschaftliche Unterricht 43, 7, 415-420
g6,C

Ben-Zvi, R., Eylon, B.S., Silberstein, J. (1986). Is an atom of copper malleable ? Journal of Chemical Education 63, 1, 64-66
g6,g7,P,AT

Ben-Zvi, R., Eylon, B.S., Silberstein, J. (1986). Revision of course materials on the basis of research on conceptual difficulties. Studies in Educational Evaluation 12, 213-223
g7,C

Ben-Zvi, R., Silberstein, J., Mamlok, R. (1990). Macro-micro relationships: a key to the world of chemistry. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 183-197
g6,g7,P,AT,C,EN

Bernstein, A.C., Cowan, P.A. (1981). Children's conceptions of birth and sexuality. In: Bibace, R., Walsh, M.: New directions for child development: Children's conceptions of health, illness, and bodily functions. San Francisco: Jossey-Bass, 9-28
g6,B

Berzonsky, M.D. (1973). A factor-analytic investigation of child animism. The Journal of Genetic Psychology 122, 287-295
g6,B

Bibace, R., Walsh, M. (1981). Children's conceptions of illness. In: Bibace, R., Walsh, M.: New directions for child development: Children's conceptions of health, illness, and bodily functions. San Francisco: Jossey-Bass, 31-48
g6,B

Birnie, H.H. (1989). The alternative conceptions of a particle theory of air possessed by year 1-5 primary students, their parents, and their teachers. Research in Science Education 19, 25-36
g6,g8,P,AT,M

Boeha, B.B. (1990). Aristotle, alive and well in Papua New Guinea science classrooms. Physics Education 25, 280-283
g3,g6,P,M,OCI

Brosnan, T. (1990). Categorising macro and micro explanations of material change. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 198-211
g6,g7,P,AT,C

Brumby, M. (1981). The use of problem-solving in meaningful learning in biology. Research in Science Education 11, 103-110
g6,B,OCI

Buck, P. (1990). Jumping to the atoms: The introduction of atoms via nesting systems. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 212-219
g7,P,AT

Burbules, N.C., Linn, M.C. (1988). Response to contradiction: Scientific reasoning during adolescent. Journal of Educational Psychology 80, 1, 67-75
g6,P,M,GEN

Caldwell, O.W., Lundeen, G.E. (1933). Changing unfounded beliefs - A unit in biology. School Science and Mathematics 33, 4, 394-413
g6,g7,B

Carmichael, P., Driver, R., Holding, B., Phillips, I., Twigger, D., Watts, M. (1990). Research on students' conceptions in science: A bibliography. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education (CLIS)
g1

Chiappetta, E.L., McBride, J.W. (1980). Exploring the effects of general remediation on ninth-graders' achievement of the mole concept. Science Education 64, 5, 609-614
g7,C

Cornett, J.W., Yeotis, C., Terwilliger, L. (1990). Teacher personal practical theories and their influence upon teacher curricular and instructional actions: A case study of a secondary science teacher. Science Education 74, 5, 517-529
g8,CTL

Crider, C. (1981). Children's conceptions of the body interior. In: Bibace, R., Walsh, M.: New directions for child development: Children's conceptions of health, illness, and bodily functions. San Francisco: Jossey-Bass, 49-65
g6,B

Dall'Alba, G., Walsh, E., Bowden, J., Martin, E., Marton, F., Masters, G., Ramsden, P., Stephanou, A. (1989). Assessing understanding: A phenomenographic approach. Research in Science Education 19, 57-66
g5,g6,P,M,OCI

Dawson, C., Rowell, J. (1984). Displacement of water: weight or volume ? An examination of two conflict based teaching strategies. Research in Science Education 14, 69-77
g7,P,M

Dierks, W. (1990). An approach to the educational problem of introducing the discontinuum concept in secondary chemistry teaching and attempted solution. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 177-182
g7,C

Dreyfus, A., Jungwirth, E. (1990). Macro and micro about the living cell: Which explains what ? In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 107-118
g7,B

Dreyfus, A., Jungwirth, E., Eliovitch, R. (1990). Applying the "cognitive conflict" strategy for conceptual change - some implications, difficulties, and problems. Science Education 74, 5, 555-569
g7,B,OCI

Driel, J.H. van, Vos, W. de, Verdonk, A.H. (1990). Why do some molecules react, while others don't ? In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 151-162
g7,C

Duit, R. (1990). On the role of analogies, similes and metaphors in learning science. Paper presented at the annual meeting of the American Educational Research Association, Atlanta
g1

Duit, R. (1990). The constructivistic view - A both fashionable and fruitful paradigm for science education research and practice. Paper presented as part of the seminar series "Constructivism in Education", University of Georgia, College of Education, Athens
g1

Duit, R. (in press). Students' conceptual frameworks - consequences for learning science. In: Glynn, S., Yeany, R., Britton, B.: The psychology of learning science. Hillsdale: Erlbaum
g1

Fedra, D. (1989). Ausschärfung und Weiterentwicklung von vorwissenschaftlichen Vorstellungen beim Erlernen des 2.Hauptsatzes der Thermodynamik. Kassel: Gesamthochschule Kassel
g6,g7,P,T,EN,IRR,AT,CSC,OCI

Fensham, P.J. (1983). A research base for new objectives of science teaching. Science Education 67, 1, 3-12
g1

Fensham, P.J., Garrard, J., West, L. (1981). The use of cognitive mapping in teaching and learning strategies. Research in Science Education 11, 121-129
g5,g7

Finegold, M., Trumper, R. (1989). Categorizing pupils' explanatory frameworks in energy as a means to the development of a teaching approach. Research in Science Education 19, 97-110
g6,P,EN,OCI

Fox, D., Wall, A. (1990). Aristotle versus Galileo. Primary Science Review 14, 18-19
g6,P,M

Gao, L., Adcock, H., Carr, M., Hume, A., Nicholson, D., Silvester, J., Smith, D. (1989). An account of action research investigating teacher change. Research in Science Education 19, 112-122
g8,g9,CTL,OCI

Garrard, J., Brumby, M. (1984). Students' perceptions of health. Research in Science Education 14, 1-13
g6,B,OCI

Garrard, J., Brumby, M. (1985). Living and learning in a hectic world: Students' perceptions of stress. Research in Science Education 15, 58-67
g6,B,OCI

Gil-Perez, D., Carrascosa, J. (1990). What to do about science "misconceptions". Science Education 74, 5, 531-540
g1,g7

Goldman, R., Goldman, J. (1982). Children's sexual thinking. London: Routledge & Kegan Paul
g6,B

Goldsmith, R.H. (1978). Changes in the importance of certain popular science misconceptions. School Science and Mathematics 78, 1, 31-36
g6,B

Griffiths, A.K., Preston, K.R. (1990). Grade 12 students' misconceptions relating to fundamental characteristics of atoms and molecules. Memorial University of Newfoundland: Department of Curriculum and Instruction
g6,P,AT,C

Gunstone, R.F., White, R.T. (1983). Testing and teaching with Venn diagrams. The Australian Science Teachers Journal 29, 3, 63-64
g5,g7

Hallden, O. (1990). Questions asked in common sense contexts and in scientific contexts. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 119-130
g6,B,OCI

Hand, B. (1989). Student understanding of acids and bases: A two year study. Research in Science Education 19, 133-144
g6,C,OCI

Happs, J.C. (1983). Using socio-cognitive conflict to establish an understanding of the scientific meaning of rock. Research in Science Education 13, 61-71
g7,OCI

Hart, C. (1987). A teaching sequence for introducing forces to year 11 physics students. The Australian Science Teachers Journal 33, 1, 25-28
g7,P,M

Hope, J., Townsend, M. (1983). Student teachers' understanding of science concepts. Research in Science Education 13, 177-183
g6,P,M,B,GEN

Johnston, K. (1990). Students' responses to an active learning approach to teaching the particulate theory of matter. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 247-265
g7,P,AT,OCI,OIM

Joling, E., Voorde, H.H. ten, Verdonk, A.H. (1990). Verstudieboeking: De totstandkoming van feiten beschouwd vanuit een didactische optiek. Tijdschrift voor Didactiek der β-wetenschappen 8, 1, 197-221
g1

Kapteijn, M. (1990). The functions of organisational levels in biology for describing and planning biology education. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 139-150
g6,B

Kirkwood, V., Bearlin, M., Hardy, T. (1989). New approaches to the inservice education in science and technology of primary and early childhood teachers (or mum is not dumb after all !). Research in Science Education 19, 174-186
g8,g9,CTL,STS,OCI

Klaassen, C.W.J.M., Eijkelhof, H.M.C., Lijnse, P.L. (1990). Considering an alternative approach to teaching radioactivity. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 304-315
g7,P,AT

Koocher, G.P. (1981). Children's conceptions of death. In: Bibace, R., Walsh, M.: New directions for child development: Children's conceptions of health, illness, and bodily functions. San Francisco: Jossey-Bass, 85-99
g6,B

Levin, I., Siegler, R.S., Druyan, S. (1990). Misconceptions about motion: development and training effects. Child Development 61, 1544-1557
g6,g7,P,M

Licht, P. (1990). A microscopic model for a better understanding of the concepts of voltage and current. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 316-327
g7,P,E

Lijnse, P. (1990). Energy between the life-world of pupils and the world of physics. Science Education 74, 5, 571-583
g6,g7,P,EN

Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J. (1990). Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press
g6,g7,P,AT,C,B

Mayer, M. (1990). Common sense Wissen gegen wissenschaftliches Wissen: Der Fall von Druck, Gewicht und Schwere (Gravita). physica didactica 17, 2, 43-67
g6,P,M,GEN

McGuigan, L. (1990). Words, words, words. Primary Science Review 14, 32-33
g5

Meheut, M., Chomat, A. (1990). The bounds of children's atomism: an attempt to make children build up a particulate model of matter. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 266-282
g6,P,AT

Meyling, H. (1990). Wissenschaftstheorie im Physikunterricht der gymnasialen Oberstufe. Bremen: Universität Bremen
g6,g7,CSC,OCI

Millar, R. (1990). Making sense: What use are particle ideas to children ? In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 283-293
g7,P,AT

Mitchell, I. (1989). The influence of class dynamics on individual learning. Research in Science Education 19, 198-209
g7,CTL

Moorfoot, J.J. (1983). An alternative method of investigating pupils' understanding of physics concepts. School Science Review 64, 561-566
g5,g6,P,M

Nay, U. (1989). Kinder deuten chemische Versuche. Münster: Eigen-Verlag
g6,P,AT,C

Niedderer, H., Bethge, T., Cassens, H. (1990). A simplified quantum model: a teaching approach and evaluation of understanding. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 67-80
g6,g7,P,Q

Osborne, J. (1990). What do we know about light ? A teacher's guide to attainment target 15. Primary Science Review 14, 10-12
g6,P,O

Pritchard, A.J. (1990). Biology education and particulate theory: "Too much chemicals !". In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 131-138
g6,B,OCI

Ralya, L.L., Ralya, L.L. (1940). Some significant concepts and beliefs in astronomy and geology of entering college freshmen and the relation of these to general scholastic aptitude. School Science and Mathematics 40, 727-734
g6,P,AS

Rice, P. (1989). Thai conceptions of illness. Research in Science Education 19, 231-240
g6,B,OCI

Rowell, J.A., Dawson, C.J. (1980). Mountain or mole hill: Can cognitive psychology reduce the dimensions of conceptual problems in classroom practice ? Science Education 64, 5, 693-708
g7,C

Rowell, P.M. (1990). Science concepts and children's writing: A preliminary study. Paper presented at the annual meeting of the Canadian Society for the Study of Education, Victoria
g4,g5

Rozier, S., Viennot, L. (1990). Students' reasoning in thermodynamics. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 36-49
g6,P,T,AT

Schollum, B. (1983). Arrows in science diagrams: Help or hindrance for pupils ? Research in Science Education 13, 45-59
g6

Selman, R.L., Krupa, M.P., Stone, C.R., Jaquette, D.S. (1982). Concrete operational thought and the emergence of the concept of unseen force in children's theories of electromagnetism and gravity. Science Education 66, 2, 181-194
g6,P,M,MAG

Sequeira, M., Leite, L. (1990). On relating macroscopic phenomena to microscopic particles at the Junior High School level. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 220-232
g6,P,AT

Sere, M.G. (1990). Passing from one model to another: which strategy ? In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 50-66
g7,P,AT

Shayer, M. (1986). Comments and criticsm: Comments on "A research methodology for studying how people think". Journal of Research in Science Teaching 23, 9, 849-850
g5

Shymansky, J.A., Norman, O., Woodworth, G., Dunkhase, J.A., Matthews, C., Chin Tang Liu, Hui-Ju Huang (1990). Constructivist ideas as a basis for inservice teacher education: First year results of a program to enhance Middle School teachers' understanding of target concepts in the area of electricity and simple circuitry. Paper presented to the annual meeting of the National Association for Research in Science Teaching, Atlanta
g9

Stanbridge, B. (1989). Some classroom applications of current ideas on conceptual learning in science. Research in Science Education 19, 268-277
g7,P,E

Stavy, R., Rager, T. (1990). Students' conceptions of the three dimensions of the quantity of matter - Volume, mass and number of particles: static systems. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 233-246
g6,P,M,AT,GEN

Steward, M.S., Steward, D.S. (1981). Children's conceptions of medical procedures. In: Bibace, R., Walsh, M.: New directions for child development: Children's conceptions of health, illness, and bodily functions. San Francisco: Jossey-Bass, 67-82
g6,B

Stewart, J. (1983). Student problem solving in High School genetics. Science Education 67, 4, 523-540
g6,B

Stewart, J., Van Kirk, J., Rowell, R. (1979). Concept maps: A tool for use in biology teaching. The American Biology Teacher 41, 3, 171-175
g7,B

Sumfleth, E., Stachelscheid, K. (1990). Eine Untersuchung zum Vorwissen der Schüler zu Beginn des Chemieunterrichts in der Klasse 9. chimica didactica 16, 139-149
g5,g6,C

Treagust, D.F., Duit, R., Lindauer, I., Joslin, P. (1989). Teachers' use of analogies in their regular teaching routines. Research in Science Education 19, 291-299
g8,CTL

Valk, A.E. van der, Bormans, H.F.H., Taconis, R., Lijnse, P.L. (1990). The need for a particulate description of macroscopic energy phenomena. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 294-303
g7,P,AT,EN

Voorde, H.H. ten (1990). On teaching and learning about atoms and molecules from a van Hiele point of view. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 81-104
g7,P,AT,C

Vos, W. de (1990). Seven thoughts on teaching molecules. In: Lijnse, P.L., Licht, P., Vos, W. de, Waarlo, A.J.: Relating macroscopic phenomena to microscopic particles: a central problem in secondary science education. Utrecht: CD-β Press, 163-176
g3,g7,C,P,AT

Whitelock, D. (1990). How well does a causal model of commonsense reasoning represent the structure of children's understanding about motion ? Paper given at the British Educational Conference at Roehampton
g6,P,M

Whitelock, D. (1991). Investigating a model of commonsense thinking about causes of motion, with 7-16 year old pupils. International Journal of Science Education, to be published
g6,P,M

ANHANG 2

Im Juli 1990 haben – wie an anderer Stelle bereits erwähnt – Kollegen aus Leeds eine Bibliographie herausgegeben, die der hier vorliegenden im Umfang und in den verwendeten Schlagworten ähnlich ist.
In der folgenden Liste erscheinen die Publikationen aus dieser Bibliographie, die in der vorliegenden nicht enthalten sind.
Diese Artikel sind nur zum Teil verschlagwortet worden.

APPENDIX 2

As has already been mentioned already in July 1990 colleagues in Leeds issued a bibliography that is comparable to the present one where numbers of articles contained and keywords used are concerned.
In the following the articles from the Leeds bibliography that are not contained in the present bibliography are listed. Due to lack of time not all of the articles have yet been given keywords.

Carmichael, P., Driver, R., Holding, B., Phillips, I., Twigger, D., Watts, M. (1990):
Research on students' conceptions in science – a bibliography.
Leeds: University of Leeds, Children's Learning in Science Research Group

Wenn Sie an dieser Bibliographie interessiert sind, so schreiben Sie bitte an:

If you are interested in this bibliography, please contact:

The Project Secretary
Children's Learning in Science Research Group
Centre for Studies in Science and Mathematics Education
The University of Leeds
Leeds LS29JT
U.K.

ANHANG 2

APPENDIX 2

Aalst, H. van (1980). The research-practitioner interface in science and mathematics education. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson C.: Cognitive development and reseach in science and mathematics. Proceedings of an international seminar in 1979. Leeds: The University of Leeds, 397-416
g5

Abraham, C. (1984). Problems in categorizing content: A discussion of the limits of content analysis. Paper presented to the British Psychological Society Conference, London, England
g5

Alexander, S.K. (1982). Food web analysis: an ecosystem approach. The American Biology Teacher 44, 3, 186-190
g6,B

Alvermann, D., Hynd, C. (1989). The influence of discussion and text on the learning of counter intuitive science concepts. Paper presented at the annual meeting of the American Educational Research Association, Boston, MA

Anamuah-Mensah, J. (1986). Cognitive strategies used by chemistry students to solve volumetric analysis problems. Journal of Research in Science Teaching 23, 9, 759-769

Anamuah-Mensah, J., Erickson, G., Gaskell, J. (1987). Development and validation of a path analytic model of students' performance in chemistry. Journal of Research in Science Teaching 24, 8, 723-738

Anastasiades, T. (1986). Understanding plants and water. Lessons using a process approach. The Science Curriculum Review in Leicestershire
g6,B

Anderson, C.W., Smith, E.L. (1983). Children's conceptions of light and color: Developing the concept of unseen rays. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada
g6,P,O,AT

Andersson, B. (1983). Pupils' content-oriented reasoning and course requirements in science. In: Hadary, D.E., Vincentini, M.: Proceedings of US-Italy Joint Seminar on Science Education for Elementary School Children, Frascati, Italy. Washington, D.C.: American University, 41-45

Andreani Dentici, D., Grossi, M.G., Borghi, L., De Ambrosis, A., Massara, C.I. (1984). Understanding floating: A study of children aged between six and eight years. European Journal of Science Education 6, 3, 235-243
g6,P,M

Angotti, J.A.P., Caldas, I.L., Delizoicou Neto, D., Rudinger, E., Pernambuco, M.M.C.A. (1978). Teaching relativity with a different philosophy. American Journal of Physics 46, 12, 1258-1262

Appleton, K., Hawe, E., Biddulph, F., Osborne, R. (1984). So you think the guide materials look good ! Research in Science Education 14, 206-212

Aquila, C. dell', Gennaro, M. di, Picciarelli, V. (1985). The logic of hypothesis testing and the control of variables formal schema: Is there a link ? European Journal of Science Education 7, 1, 67-72

Arca, M., Guidoni, P. (1983). Scientific knowledge, cognitive development and basis science education. In: Hadary, D.E., Vincentini, M.: Proceedings of US-Italy Joint Seminar on Science Education for Elementary School Children. Frascati, Italy. Washington, D.C.: American University, 29-39

Arnold, B. (1983). Beware the molecell ! Aberdeen College of Education Biology Newsletter, 42, 2-6

Arnold, B., Simpson, M. (1979). The concept of living things. Aberdeen College of Education Biology Newsletter, 33, 17-21

Arnold, B., Simpson, M. (1980). An investigation of the development of the concept of photosynthesis to SCE"O"grade. Aberdeen College of Education

Arnold, B., Simpson, M. (1980). The concept of photosynthesis at "O"-grade - Why pupil difficulties occur. Scottish Association For Biological Education Newsletter, 5

Arnold, B., Simpson, M. (1981). Diagnostic testing for pupil difficulties in osmosis - A teachers' handbook. Aberdeen: Aberdeen College of Education

Arnold, B., Simpson, M. (1982). Osmosis - models, methods and mayhem: An exercise in diagnosing pupil difficulties. Scottish Association for Biological Education Newsletter, 9

Ashmore, A.D., Frazer, M.J., Casey, R.J. (1979). Problem solving and problem solving networks in chemistry. Journal of Chemical Education 55, 6, 377-379

Bainer, D.L. (1985). What to do when people disagree: Adressing ideational pluralism in science classes. Science Education 69, 2, 171-183

Baird, J.R., White, R.T. (1982). A case study of learning styles in biology. European Journal of Science Education 4, 3, 325-337

Bar, V. (1986). The development of the conception of evaporation. Jerusalem: The Hebrew University of Jerusalem

Bar, V. (1989). Children's views about the water cycle. Science Education 73, 4, 481-500

Barboux, M., Chomat, A., Sere, M.G., Tiberghien, A. (1981). Ils necomprennent rien ... et pourtant ? Bulletin de l'Union des Physicens, 983-989

Barboux, M., Chomat, A., Sere, M.G., Tiberghien, A. (1981). Les representations et les interpretations d'eleves concernant les notions de temperature, chaleur, gaz, pression en classe de 6eme. Troisiemes Journees Internationales sur l'Education Scientifique, Chamonix, 103-118

Batt, R.H. (1980). A Piagetian learning cycle for introductory chemical kinetics. Journal of Chemical Education 57, 634-635

Bell, B. (1981). Animal, plant, living: Notes for teachers. LISP working paper 30, University of Waikato
g6,B

Bell, B. (1981). What is a plant: Some children's ideas. New Zealand Science Teacher 31, 10-14
g6,B

Bell, B. (1985). Students' understanding of plant nutrition. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science. Proceedings of a conference 1984, Woolley Hall. London: SSCR, 36-39
g6,B

Bell, B., Barron, J., Stephenson, E. (1985). The construction of meaning and conceptual change in classroom settings: Case studies in plant nutrition. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,B

Bell, B., Watts, M., Ellington, K. (1985). Learning, doing and understanding in science: The proceedings of a conference. Secondary Science Curriculum Review. Woolley Hall

Ben-Zvi, R., Eylon, B., Silberstein, J. (1988). Theories, principles and laws. Education in Chemistry 25, 89-92

Bereiter, C. (1985). Toward a solution of the learning paradox. Review of Educational Research 55, 2, 201-226
g1

Berzonsky, M.D. (1973). A factor analytic investigation of child animism. Journal of General Psychology 122, 287-295
g6,B

Beveridge, M. (1983). Negative and positive evidence in the development of children's understanding of the process of evaporation. Manchester, England: University of Manchester, Department of Education

Billeh, V.Y., Khalili, K. (1982). Cognitive development and comprehension of physics concepts. European Journal of Science Education 4, 1, 95-104

Billeh, V.Y., Pella, M.O. (1970). Cultural bias in the attainment of concepts of the biological cell by elementary school children. Journal of Research in Science Teaching 7, 2, 73-83

Bliss, J., Ogborn, J. (1979). The analysis of qualitative data. European Journal of Science Education 1, 4, 427-440
g5

Boschhuizen, R. (1990). The concept of photosynthesis and pupils' ideas on the concept of "cycles". In: Voorbach, M.T., Prick, L.G.M.: Teacher Education 6. Research and developments in teacher education in the Netherlands, in press

Boschhuizen, R., Brinkman, F.G. (1989). The biology teacher and research methods on pre-instructional ideas in education. In: Voorbach, M.T., Prick, L.G.M.: Teacher Education 5. Research and developments in teacher education in the Netherlands, 66-75
g5

Boylan, C. (1988). Enhancing learning in science. Research in Science and Technological Education 6, 2, 205-217
g1

Briggs, H., Brook, A. (1985). Students' ideas of heat. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science. The proceedings of a conference, Woolley Hall 1984. London, 40-46
g6,P,T

Briggs, H., Holding, B. (1986). Aspects of secondary students' understanding of elementary ideas in chemistry. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g6,C

Brinkman, F.G., Boschhuizen, R. (1989). Preinstructional ideas in biology: a survey in relation with different research methods on concepts of health and energy. In: Voorbach, M.T., Prick, L.G.M.: Teacher Education 5. Research and developments in teacher education in the Netherlands, 75-90
g6,P,EN,B

Brna, P. (1987). Confronting dynamics misconceptions. Instructional Science 16, 4, 351-380

Brna, P. (1988). Confronting misconceptions in the domain of simple electric circuits. Instructional Science 17, 1, 29-55
g7,P,E

Brook, A. (1990). Constructivist approaches to the teaching of energy: a report on schemes in action. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g7,P,EN

Brook, A., Driver, R., Anderson, M., Davidson, J. (1986). The construction of meaning and conceptual change in classroom settings: case studies on energy. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education
g7,P,EN

Brook, A., Driver, R., Hind, D. (1989). Progression in science: the development of pupils' understanding of physical characteristics of air across the age range 5-16 years. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Brown, J.S., Van Lehn, K. (1980). Repair theory: A generative theory of bugs in procedural skills. Cognitive Science 4, 4, 379-426
gl

Bruner, J., Haste, H. (1987). Making sense: The child's construction of the world. London: Methuen

Cantor, G.N. (1981). Criticisms of the projectile theory of light. Physics Education 16, 112-119

Caravita, S., Giuliani, G. (1985). Discussion in school classes: collective modelling of schemata. Rome, Italy: Institute of Psychology, CNR

Carey, S. (1985). Conceptual change in childhood. Cambridge, Mass.: MIT Press
gl

Carey, S., Evans, R., Honda, M., Jay, E., Unger, C. (1989). "An experiment is when you try it and see if it works": A study of grade 7 students' understanding of the construction of scientific knowledge. International Journal of Science Education 11, 5, 514-529

Champagne, A.B. (1981). Qualitative analysis of mechanics problems: Introductory instruction for physics. Pittsburgh: University of Pittsburgh, Learning Research and Development Centre

Claxton, G.L. (1982). School science: Falling on stony ground, or choked by thorns ? Chelsea: Chelsea College
gl

Claxton, G.L. (1983). Teaching and acquiring scientific knowledge. In: Keen, T., Pope, M.: Kelly in the classroom: Educational application of personal construct psychology. Montreal: Cybersystems Inc.

Clement, J. (1982). Spontaneous analogies in problem solving: The progressive construction of mental models. Paper presented at the annual meeting of the American Educational Research Association, New York

Closset, J.L. (1983). Le raisannement sequentiel en electrocinetique. Paris: University of Paris VII, Laboratoire de didactique de la physique dans l'enseignement superieur

Cohen, M.R. (1983). Science process skills that foster concept development: synesthesia, serendipity and skepticism. In: Tamir, P., Hofstein, A., Ben-Peretz, M.: Preservice and inservice training of science teachers. Rehovot: Balaban International Science Services, 403-413

Comber, M. (1983). An analysis of Nuffield Combined Science and science 5-13 in terms of concepts related to the theory of matter. School Science Review 64, 228, 556-561

Comber, M. (1983). Concept development in relation to the particulate theory of matter in the Middle School. Research in Science and Technological Education 1, 1, 27-39

Connelly, F.M. (1983). Enquiry teaching in science: A handbook for Secondary School teachers. Ontario: Ontario Institue for Studies in Education

Cosgrove, M. (1983). Mixtures: An introduction to chemistry. Hamilton, N.Z.: Hamilton Teachers' College

Cosgrove, M., Osborne, R. (1983). Electric current, developing a concept. Hamilton, N.Z.: University of Waikato, Hamilton Teachers' College

Cosgrove, M., Osborne, R. (1985). Lesson frameworks for changing children's ideas. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland, London, Portsmouth: Heinemann, 101-111

Cranston, N., McAllister, R. (1988). Pupils' learning of science in primary schools: a system level investigation. Research in Science Education 18, 22-34

Crookes, J., Goldby, G. (1984). How we see things: An introduction to light: Trial material and a case study. The Science Curriculum Review in Leicestershire, Science Process Curriculum Group

Curtis, S., Millar, R. (1988). Language and conceptual understanding in science: A comparison of English and Asian language speaking children. Research in Science and Technological Education 6, 1, 61-77

de Vos, W., Verdonk, A.H. (1985). A new road to reactions. Journal of Chemical Education 62, 3, 239-240, 648-649, 972-974

de Vos, W., Verdonk, A.H. (1986). A new road to reactions: teaching the heat effect of reactions. Journal of Chemical Education 63, 3, 972-974

Deese, J. (1981). Text structure, strategies and comprehension in learning from scientific textbooks. In: Robinson, J.T.: Research in science education: new questions, new direcections. Louisville: CERE/ERIC, 53-68

Dekkers, J., McLaren, A., Druger, M. (1981). Unsolved problem areas in biology: Some student and teacher views. Research in Science Education 11, 59-65

Denicolo, P. (1983). Metaphor in the teaching and learning of chemistry: An empirical study. Paper presented at the Annual Conference for Postgraduate Psychology. St Andrew's University, Scotland

Di Sessa, A. (1980). Learnable representations of knowledge: A meaning for the computional metaphor. In: Lochhead, J., Clement, J.: Cognitive process instruction. Philadelphia: Franklin Institute Press
gl

Di Sibio, M (1982). Memory for connected discourse: A constructivist view. Review of Educational Research 52, 2, 149-174
gl

Diamond, C.T.P. (1982). "Turning On" teachers' own constructs: A process approach to exploration and elaboration. Queensland: University of Queensland, Department of Education

Dierks, W. (1981). Stoichiometric Calculations: Known problems and proposed solutions at a chemistry-mathematics interface. Studies in Science Education 8, 93-105

Dierks, W. (1981). Teaching the mole. European Journal of Science Education 3, 145-157

Dierks, W., Weninger, J., Herron, J.D. (1985). Mathematics in the chemistry classroom. Part 2: The special nature of quantity equations. Part 2: Elementary entites play their part. Journal of Chemical Education 62, 11, 839-841, 1021-1023

Donnelly, J.F., Welford, A.G. (1988). Children's performance in chemistry. Education in Chemistry 25, 7-10

Dow, W.M., Auld, J., Wilson, D. (1978). Pupils' concepts of gases, liquids and solids. Dundee: Dundee College of Education
g6,P,M

Downes, M. (1985). Stored energy. A pupil guided in-service exercise. Teaching Science 3, 1, 5-6
g6,P,EN

Driver, R. (1981). Pupils' alternative frameworks in science. European Journal of Science Education 3, 1, 93-101

Driver, R. (1983). Changing perspectives on science lessons. British Journal of Educational Psychology Monograph: Bennett, S.N., Desforges, C.W.: Recent advances in classroom research
gl

Driver, R. (1984). Students' alternative frameworks and the learning of science. In: Childs, P.E.: Mixed ability teaching in science: The proceedings of the CHEMED-Ireland 1984 conference. Limerick, Ireland: Thomond College of Education, 3-26

Driver, R. (1985). Review of research into children's thinking and learning in science. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science. Proceedings of a conference. Woolley Hall, SSCR. London
gl

Driver, R. (1986). Reconstruction the science curriculum: the approach of the Children's Learning in Science Project. Paper presented at the annual meeting of the American Educational Research Association, San Francisco
gl

Driver, R. (1988). Restructuring the science curriculum: some implications of studies of learning for curriculum development. In: Layton, D.: Innovations in Science and Technology Education Vol.2. Paris: UNESCO

Driver, R. (1989). Progression in children's understanding in science: research and the National Curriculum. Paper presented at the ASE Education Conference, Nottingham
gl

Driver, R. (1989). Theory into practice: A constructivistic approach to curriculum development. In: Fensham, P.: Development and dilemmas in science education. London: Falmer Press

Driver, R. (1990). The teaching and understanding of concepts in science. In: Entwistle, N.: Handbook of educational ideas and practices. London: Routledge & Kegan Paul

Driver, R., Bell, B. (1985). Students' thinking and the learning of science: A constructivist view. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Driver, R., Oldham, V. (1986). A constructivist approach to curriculum development in science. Studies in Science Education 13, 105-122

Driver, R., Russell, T. (1982). An investigation of the ideas of heat, temperature and change of state of children aged between 8 and 14 years. Leeds: University of Leeds
g6,P,T,M

Duit, R. (1984). Learning the energy concept in school - empirical results from The Philippines and West Germany. Physics Education 19, 2, 59-66
g6,P,EN

Duschl, R.A. (1988). Abandoning the scientific legacy of science education. Science Education 72, 1, 51-63

Easley, J. (1981). The need for a cognitive ethnography of school science and mathematics. In: Robinson, J.J.: Research in Science Education: New Questions, new directions: The proceedings of a conference. Louisville: CERE/ERIC, 169-183

Easley, J. (1984). A teacher educator's perspective on students' and teachers' schemes. Paper presented at the Conference on Thinking, Harvard Graduate School of Education

Easley, J. (1985). A challenge: On seeing "face-to-face" instead of "through a glass darkly". Paper presented at the annual meeting of the American Educational Research Association, Chicago

Edwards, J., Frazer, K. (1983). Concept maps as reflectors of conceptual understanding. Research in Science Education 13, 19-26

Edwards, J., Marland, P. (1982). Student thinking in a secondary biology classroom. Research in Science Education 12, 32-41
g6,B

Ellse, M. (1988). Transferring not transforming energy. School Science Review 69, 248, 427-437

Engel Clough, E. (1984). How students interpret instances of biological adaptation. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding science. The proceedings of a conference. Woolley Hall. London: SSCR, 47-53
g6,B

Erickson, G. (1982). Students' beliefs about science concepts: A missing ingredient in the instructional process. Vancouver: University of British Columbia

Erickson, G., Hobbs, E. (1978). A development study of student beliefs about force concepts. Paper presented to the Annual Convention of the Canadian Society for the Study of Education, London/Ontario
g6,P,M

Fasching, J.L., Erickson, B.L. (1985). Group discussions in the chemistry classroom. Journal of Chemical Education 62, 10, 842-846

Fensham, P.J., Garrard, J., West, L. (1981). The use of cognitive mapping in teaching and learning strategies. Research in Science Education 11, 121-129

Fensham, P.J., Garrard, J., West, L. (1982). A comparitive critique of several methods for collecting data for cognitive mapping. Research in Science Education 12, 9-16

Finegold, M., Gorsky, P. (1988). Learning about forces: Simulating the outcomes of pupils' misconceptions. Instructional Science 17, 251-261

Finley, F.N. (1982). An empirical determination of concepts contributing to successful performance of a science process: A study of mineral classification. Journal of Research in Science Teaching 19, 8, 689-696

Finley, F.N. (1984). Using properties from clinical interviews as variables to compare student knowledge. Journal of Research in Science Teaching 21, 8, 809-818
g5

Fisher, K.M. (1985). Elaboration of cognitive knowledge of biology from childhood to adulthood. The Journal of General Psychology 112, 4, 389-397
g6,B

Gabel, D., Sherwood, R. (1980). The effect of student manipulation of molecular models on chemistry achievement according to Piagetian level. Journal of Research in Science Teaching 17, 1, 75-81

Gabel, D., Sherwood, R. (1984). Analyzing difficulties with mole-concept tasks by using familiar analog tasks. Journal of Research in Science Teaching 21, 9, 843-851

Gailiunas, P. (1988). Is energy a thing ? Some misleading aspects of scientific language. School Science Review 69, 248, 587-590

Gair, J., Stancliffe, D.T. (1988). Talking about toys: An investigation of children's ideas about force and energy. Research in Science and Technological Education 6, 2, 167-180
g6,P,M,EN

Gamble, R. (1986). Cognitive momentum. Physics Education 21, 1, 24-27

Gamble, R. (1986). Proportionality and quantitative relationships in physics. Physics Education 21, 6, 354-359

Ganiel, U., Idar, J. (1984). A computer based approach to the treatment of student misconceptions in physics. In: Lijnse, P.: The many faces of teaching and learning mechanics in secondary and early tertiary education. Proceedings of a conference on physics education. Utrecht: GIREP/SVO/UNESCO, 486-499
g7,P,M

Garrard, J., Brumby, M. (1984). Students' perceptions of health. Research in Science Education 14, 1-13
g6,B

Gentner, D., Stevens, A.L. (eds.) (1983). Mental models. Hillsdale, N.J.: Lawrence Erlbaum
g1
Gibson, L. (1984). Some recent research into children's ideas of energy. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science. The proceedings of a conference. Woolley Hall. London: SSCR, 54-57
g6,F,EN
Gilbert, J. (1982). Pupils' learning in science - Issues in cognitive development. In: Head, J.: Science education for the citizen. Proceedings of the UK-USA seminar. London, 27-36
g1
Gilbert, J.K. (1985). Some barriers to personal constructivist science education. Paper presented at 6th International Personal Construct Psychology Congress, Cambridge (England)
g1
Glaserfeld, E. von (1984). An introduction to radical constructivism. In: Watzlawick, P.: The invented reality. New York: W.W. Norton, 17-40
g1
Glaserfeld, E. von (1985). Reconstructing the concept of knowledge. Archives de Psychologie 53, 91-101
g1
Glaserfeld, E. von (1989). Abstraction, re-presentation and reflection: an interpretation of experience and Piaget's approach. In: Steffe, L.P.: Epistemological foundations of mathematical experience. New York: Springer Verlag
g1
Glaserfeld, E. von (1989). An exposition of constructivism: Why some like it radical. In: Davis, R.B., Maher, C.A., Noddings, N.: Constructivist views on the teaching and learning of mathematics. In press: NCTM Monographs
g1
Glaserfeld, E. von (1989). Cognition, construction of knowledge and teaching. Synthese 80, 1, 121-140
g1
Goldsmith, R.H. (1978). Changes in the importance of certain popular science misconceptions. School Science and Mathematics 78, 1, 31-36
Gorodetsky, M., Hoz, R. (1980). Use of concept profile analysis to identify difficulties in solving science problems. Science Education 64, 5, 671-678
Gorodetsky, M., Hoz, R., Vinner, S. (1986). Hierarchical solution models of speed problems. Science Education 70, 5, 565-582
Griffiths, A.K., Pottle, J.E., Whelan, P.J. (1983). Application of the learning hierarchy model to the identification of specific misconceptions for two science concepts. Paper presented at NARST, Dallas
Guesne, E. (1984). Children's ideas about light. Paris: UNESCO
g6,P,O
Guidoni, P. (1983). On natural thinking. European Journal of Science Education 7, 2, 133-140
g1
Gunstone, R.F. (1980). Word association and the description of cognitive structure. Research in Science Education 10, 45-53
g5
Gunstone, R.F., Champagne, A.B. (1990). Promoting conceptual change in the laboratory. In: Hegarty-Hazel, E.: The student laboratory and the science curriculum. London: Routledge & Kegan Paul
Gunstone, R.F., White, R.T. (1980). A matter of gravity. Paper presented at the meeting of the Australian Science Education Research Association, Melbourne
Happs, J.C. (1980). Particles. University of Waikato, LISP working paper 18

Happs, J.C. (1983). Evidence of students' alternative conceptual frameworks. New Zealand Science Teacher 34, 13-23

Happs, J.C. (1984). The utility of alternative frameworks in effecting conceptual change: Some examples from the earth sciences. Hamilton, N.Z.: University of Waikato

Harlen, W. (1983). Basic concepts and the primary/secondary science interface. European Journal of Science Education 5, 1, 25-34

Harlen, W., Osborne, R. (1985). A model for learning and teaching applied to primary science. Journal of Curriculum Studies 17, 2, 133-146

Härtel, H. (1985). The electric voltage: What do students understand ? What can be done for a better understanding ? In: Duit, R., Jung, W., Rhöneck, C. von: Aspects of understanding electricity. Proceedings of the international workshop in Ludwigsburg. Kiel: Schmidt & Klaunig, 353-362
g6,P,E

Haslam, F., Treagust, D.F. (1987). Diagnosing secondary students' misconceptions of photosynthesis and respiration in plant using a two-tier multiple choice instrument. Journal of Biological Education 21, 3, 203-211
g6,B

Hatano, G. (1990). The nature of everyday science: a brief introduction. British Journal of Developmental Psychology (in press)

Head, J. (1982). Science education for the citizen. Proceedings of the UK-USA Science Education Seminar held at Chelsea College. London: University of London, Chelsea College

Head, J. (1985). The personal response to science. Cambridge: Cambridge University Press

Head, J., Sutton, C.R. (1982). Structures of understanding and the ontogenesis of commitment. London: Chelsea College, Centre for Science Education

Hee-Hyung Cho, Kable, J.B., Nordland, F.H. (1985). An investigation of High School biology textbooks as sources of misconceptions and difficulties in genetics and some suggestions for teaching genetics. Science Education 69, 5, 707-719

Heller, J.I., Hungate, H.N. (1984). Theory-based instruction in description of mechanics problems. Paper presented at the annual meeting of the American Educational Research Association, New Orleans

Heller, J.I., Reif, F. (1984). Prescribing effective human problem-solving processes: Problem describing in physics. Berkeley: University of California, Physics Department

Helm, H., Gilbert, J.K., Watts, D.M. (1985). Thought experiments and physics education - part 2. Physics Education 20, 211-217

Henriques, A. (1979). Activites spontanees et construction des conaissances physiques. Revista Internacional 2, 5, 17-34

Henriques, A. (1979). Construction des canaissances et enseignement. Geneve: Universite de Geneve

Henriques-Christofides, A. (1979). Quelques dainees psychogenetiques sur le processes de modification de la temperature de deux corps en interaction. Geneve: Universite de Geneve

Herron, J.D. (1979). Hey, watch your language. Journal of Chemical Education 56, 5, 330-331

Herron, J.D. (1981). Understanding chemistry: A preparatory course. New York: Random House

Herron, J.D. (1983). What resarch says and how it can be used. Journal of Chemical Education 60, 10, 888-890

Herron, J.D., Cantu, L.L., Ward, R., Srinivasan, V. (1977). Problems associated with concept analysis. Science Education 61, 185-199

Hewson, P.W. (1980). A case study of the effect of metaphysical commitments on the learning of a complex scientific theory. Paper presented at the annual meeting of the American Educational Research Association
g1

Hodson, D. (1981). The nature of scientific knowledge. School Science Review 63, 223, 360-365
g1

Hodson, D. (1985). Philosophy of science and science education. Studies in Science Education 12, 25-57
g1

Hodson, D. (1986). Philosophy of science and science education. Journal of Philosophy of Education 20, 2, 241-251
g1

Hodson, D. (1986). The nature of scientific observation. School Science Review 68, 242, 17-29
g1

Holding, B. (1989). Students' developing conceptions of chemical formulae and the strategies they use to derive formulae. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Holmes, B.C., Roser, N.L. (1980). A comparison of techniques used to assess readers' prior knowledge. Paper presented at the annual meeting of the National Reading Conference, San Diego
g5

Hope, J., Townsend, M. (1983). Student teachers' understanding of science concepts. Research in Science Education 13, 177-183

Howard, R. (1989). What is "understanding" in science teaching and how can it be promoted ? School Science Review 70, 252, 116-119
g1

Hoz, R., Gorodetsky, M. (1983). The effects of misconceptions of speed and time on the solution of speed problems. In: Helm, H., Novak, J.D.: Proceedings of the international seminar: Misconceptions in Science and Mathematics. Ithaca, N.Y.: Cornell University, 346-355

Hull, C. (1984). Between the lines: The analysis of interview data as an exact art. Research Intelligence 15, 1, 8-11
g5

Idhe, A.J. (1956). Antecedents to the Boyle concept of the element. Journal of Chemical Education 33, 548-551

Inagaki, K. (1990). Young children's use of knowledge in everyday biology. British Journal of Developmental Psychology (in press)
g6,B

Inagaki, K., Hatano, G. (1987). Young children's spontaneous personification as analogy. Child Development 58, 1013-1021

Ivowi, U.M.O. (1986). Students' misconceptions about conservation principles and fields. Research in Science and Technological Education 4, 2, 127-137
g6,P,FLD

Johnson, P.E., Ahlgren, A., Blount, J.P., Petit, N.J. (1981). Scientific reasoning: garden paths and blind alleys. In: Robinson, J.T.: Research in Science Education: New questions, new directions. Louisville: CERE/ERIC, 87-114

Johnston, K. (1987). CLIS in the classroom: constructivist approaches to teaching. Education in Science 121, 29-30

Johnston, K. (1990). A constructivist approach to the teaching of the particulate theory of matter: a report on a scheme in action. Leeds: University of Leeds

Johnstone, A.H. (1979). The content - a barrier to implementation. Glasgow: University of Glasgow

Johnstone, A.H., Kellet, N.C. (1980). Learning difficulties in school science - towards a working hypothesis. European Journal of Science Education 2, 2, 175-181

Jungwirth, E. (1980). Alternative interpretations of findings in cognitive preference research in science education. Science Education 64, 1, 85-94

Jungwirth, E., Dreyfus, A. (1980). Secondary school biology students' reactions to logical fallacies in scientific as compared with everyday contexts. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of leeds, 113-120

Keil, F. (1981). Children's thinking: What never develops ? Cognition 10, 159-166

Kelly, P.J. (1980). Teaching styles and cognitive selection related to different types of biological concepts. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 239-243

Kerry, T. (1981). Thinking in science lessons. School Science Review 63, 223, 355-360

Klauer, K.J. (1989). Teaching for analogical transfer as a means of improving problem solving, thinking and learning. Instructional Science 18, 179-192

Klopfer, L., Schaube, L. (1990). Children's conceptualisation of scientific enquiry: explorations in hydrostatics and hydrodynamics. Paper presented at the annual meeting of the American Educational Research Association, Boston

Kovacs, L. (1988). Pupils' thinking about some physical principles in England and Hungary. School Science Review 69, 248, 590-592

Kuhn, D. (1989). Children and adults as intuitive scientists. Psychological Review 96, 4, 674-689

Kuhn, D., Amsel, E., O'Loughlin, M. (1988). The development of scientific thinking skills. London: Academic Press

Kuhn, D., Phelps, E. (1982). The development of problem-solving strategies. In: Reece, H.: Advances in child development and behaviour, vol.17. New York: Academic Press

Langford, J.M., Zollman, D. (1982). Conceptions of dynamics held by Elementary and High School students. Paper presented at the annual meeting of the American Association for Physics Teachers, San Francisco

Larkin, J.H. (1980). Expert and novice performance in solving physics problems. Science 208, 1335-1342

Larkin, J.H., Reif, F. (1979). Understanding and teaching problem solving in physics. European Journal of Science Education 1, 2, 191-203

Last, A.M. (1985) Doing the dishes: an analogy for use in teaching reaction kinetics. Journal of Chemical Education 62, 11, 1015-1016

Lawrenz, F., Dantchik, A. (1985). Attitudes toward energy among students in grades 4, 7 and High School. School Science and Mathematics 85, 3, 189-202

Lawson, A.E. (1983). Argumentation, language and consciousness: The cause of hypothetico-deductive reasoning. Paper presented at a symposium on "Cognitive Science and Science Education", Annual Convention of the National Association of Research in Science Teaching, Dallas/Texas

Lawson, A.E., Staver, J.R. (1989). Towards a solution of the learning paradox: emergent properties and neurological principles of constructivism. Instructional Science 18, 169-177

Lazonby, J.N., Morris, J.E., Waddington, D.J. (1982). The muddlesome mole. Education in Chemistry 19, 109-111

Leboutet, L. (1974). The effect on physics education of a better understanding of the psychological process of learning. Paris: Universite Paris

Lederman, N., Druger, M. (1985). Classroom factors related to changes in students' conceptions of the nature of science. Journal of Research in Science Teaching 22, 7, 649-662

Leinhardt, G., Greeno, J.G. (1984). The cognitive skill of teaching. Pittsburgh: University of Pittsburgh, Learning Research and Development Center

Lemke, J.L (1982). Talking physics. Physics Education 17, 6, 263-267
g4

Levin, I., Siegler, R., Douyan, S., Gardosh, R. (1990). Everyday curriculum-based physics concepts: when does short-term training bring change when years of schooling have failed to do so ? British Journal of Evelopmental Psychology (in press)

Lijnse, P. (1985). The many faces of teaching and learning mechanics in secondary and early tertiary education. Proceedings of a conference on physics education. Utrecht: SVO/UNESCO

Lin, H. (1982). Cognitive research in physics education: an overview. Paper presented at the annual meeting of the American Association of Physics Teachers, San Francisco

Linder, C. (1989). A case study of university physics students' conceptualizations of sound. Vancouver: University of British Columbia
g6,P,S

Linke, R.D., Venz, M.I. (1978). Misconceptions in physical science among non-science background students. Research in Science Education 8, 183-193

Linn, M.C. (1983). Content, context and process in reasoning during adolescence: Selecting a model. Journal of Early Adolescence 3, 63-83

Linn, M.C., Clement, C., Pulos, S. (1983). Is it a formal if it's not physics ? (The influence of content on formal reasoning). Journal of Research in Science Teaching 20, 8, 755-770

Linn, M.C., Pulos, S. (1983). Male-female differences in predicting displaced volume: strategy usage, aptitude relationships and experience influences. Journal of Educational Psychology 75, 1, 86-96

Lochhead, J. (1979). On learning to balance perceptions by conceptions: A dialogue between two science students. In: Lochhead, J., Clement, J.: Cognitive process instruction. Philadelphia: Franklin Institute Press, 147-178

Looft, W.R., Bartz, W.H. (1969). Animism revived. Psychological Bulletin 71, 1-19
g6,B

Lowe, J.P. (1988). Entropy: conceptual disorder. Journal of Chemical Education 65, 5, 403-406

Lucas, A.M. (1983). Scientific literacy and informal learning. Studies in Science Education 10, 1-36

Lucas, A.M. (1987). Public knowledge of biology. Journal of Biological Education 21, 1, 41-45

Lucas, A.M. (1988). Public knowledge of elementary physics. Physics Education 23, 1, 10-16

Lucas, A.M., Linke, R.D., Sedgwick, P.P. (1979). Schoolchildren's criteria for "alive": A content analysis approach. Journal of Psychology 103, 103-112

Luchins, A.S., Luchins, E.H. (1983). Students' misconceptions in geometric problem solving. In: Helm, H., Novak, J.D.: Proceedings of the International seminar: Misconceptions in Science and Mathematics. Ithaca, N.Y.: Cornell University, 214-217

Lybeck, L. (1980). Some theoretical considerations and experiences related to research and developments in the teaching of mathematics and science. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 328-341

Lynch, P.P., Paterson, R.E. (1980). An examination of gender differences in respect to pupils' recognition of science concept definitions. Journal of Research in Science Teaching 17, 4, 307-314

MacFarlane, D. (1985). So you think you can teach chemical equations ? Education in Chemistry 22, 2, 54

Macmillan, C.J.B., Garrison, J.W. (1984). Using the "New Philosophy of Science" in criticizing current research traditions in education. Educational Researcher, 15-21

Magoon, A.J. (1977). Constructivist approaches in educational research. Review of Educational Research 47, 4, 651-693

Mak, S.Y., Young, K. (1987). Misconceptions in the teaching of heat. School Science Review 68, 464-470

Maloney, D.P. (1983). Proportional reasoning and rule-governed behavior with the balance beam. Science Education 67, 2, 245-254

Maloney, D.P. (1985). Rule-governed approaches to physics: Conservation of mechanical energy. Journal of Research in Science Teaching 22, 3, 261-278

Maloney, D.P. (1986). Rule-governed physics - current in a series circuit. Physics Education 21, 6, 360-365

Manicas, P.T., Secord, P.F. (1983). Implications for psychology of the new philosophy of science. American Psychologist 38, 4, 399-413

Manuel, D.E. (1981). Reflections on the role of history and philosophy of science in school science children. School Science Review 62, 221, 769-771

Martin, M. (1983). An examination of student misconceptions in genetics. In: Helm, H., Novak, J.D.: Proceedings of the international seminar: Misconceptions in Science and Mathematics. Ithaca, N.Y.: Cornell University, 218-225
g6,B

Marton, F. (1978). Describing conceptions of the world around us. Gothenborg: University of Gothenborg, Institute of Education

Marton, F. (1981). Studying conceptions of reality - A metatheoretical note. Scandinavian Journal of Educational Research 25, 159-169

Marx, G., Toth, E. (1981). Les modeles dans l'enseignement des sciences. Impact: Science et Societe 31, 4, 407-416

Mayer, R.E. (1979). Twenty years of research on advance organizers: Assimilation theory is still the best predictor of results. Instructional Science 8, 133-167

McClelland, J.A.G. (1982). Ausubel's theory of learning and its application to introductory science. Part II. Primary science: An Ausubelian interview. School Science Review 64, 353-357

McClelland, J.A.G. (1983). The limits to a physics teacher's responsibility. Physics Education 18, 3, 114-116

McClelland, J.A.G. (1984). Alternative frameworks in science revisited. Sheffield: Sheffield University

McCloskey, M., Caramazza, A., Green, B. (1980). Curvilinear motion in the absence of external forces: Naive beliefs about the motion of objects. Science 210, 1139-1141

McCubbin, W.L., Embeywa, E.H. (1987). Visualisation and its role in students' assessment of scientific explanation. International Journal of Science Education 9, 2, 229-245

McDermott, L.C., Rosenquist, M.L., Zee, E.H. van (1980). Teaching physics to promote cognitive development in academically disadvantaged students aspiring to science-related careers. In: Ganiel, U.: Physics teaching: Oscillations and waves - current problems. Proceedings of the GIREP conference held at the Weizmann Institute of Science, Rehovot. Jerusalem: Balaban International Science Services, 139-154

Merrill, M.D., Kelety, J.C., Wilson, B. (1981). Elaboration theory and cognitive psychology. Instructional Science 10, 217-235

Meyer, E.F. (1987). Thermodynamics of mixing ideal gases: a persistent pitfall. Journal of Chemical Education 64, 8, 676

Millar, R.H. (1985). Negotiating knowledge through experiment: Teachers' views of "difficult" experiments. Paper presented at the BSHS conference "The Uses of Experiment", Newton Park College, Bath (England)

Millar, R.H. (1987). Towards a role for experiment in science teaching laboratory. Studies in Science Education 14, 109-118

Minstrell, J. (1982). Conceptual development research in the natural setting of a secondary school science classroom. In: Rowe, M.B.: Education in the 80s: Science. Washington D.C.: National Education Association, 129-143

Minstrell, J. (1983). Getting the facts straight. The Science Teacher 50, 1, 52-54

Minstrell, J. (1985). Constructing new conceptual understanding in the classroom. Paper prepared for the Festschrift in honor of the 25th Anniversary of the International Commission on Physics Education, Duisburg (Germany)

Minstrell, J., Simpson, G. (1986). Students' beliefs in mechanics: Cognitive process frameworks. Paper presented to the fifth Conference on Reasoning and Higher Education. Centre for the Study of Thinking, Boise, I.D. (USA)

Mintzes, J.J. (1984). Naive theories in biology: Children's concepts of the human body. School Science and Mathematics 84, 7, 548-555

Mintzes, J.J. (1989). The acquisition of biological knowledge during childhood: an alternative conception. Journal of Research in Science Teaching 26, 9, 823-824

Mitchell, A.C., Kellington, S.H. (1982). Learning difficulties associated with the particulate theory of matter in the Scottish integrated science course. European Journal of Science Education 4, 4, 429-440

Mohapatra, J.K. (1987). Can problem-solving in physics give an indication of pupils' "process knowledge" ? International Journal of Science Education 9, 1, 117-123

Moorfoot, J.J. (1983). An alternative method of investigating pupils' understanding of physics concepts. School Science Review 64, 228, 561-566

Moreira, M.A. (1978). Experimental College physics course based on Ausubel's learning theory. Science Education 62, 4, 529-545

Moyle, R. (1980). Weather. LISP working paper 21. Hamilton, N.Z.: University of Waikato

Munro, R. (1985). The folklore barrier. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton, N.Z.: University of Waikato, 90-96

Muscari, P.G. (1988). The metaphor in science and in the classroom. Science Education 72, 4, 423-431

Nadeau, R., Desaultes, J. (1984). Epistemology and the teaching of science. Ottawa: Science Council of Canada

Needham, R., Hill, P. (1987). Teaching strategies for developing understanding in science. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Neill, S.R. (1985). Should systematic observers investigate participants' views ? Research Intelligence 19, 6-7

Nersessian, N.J. (1989). Conceptual change in science and science education. Synthese 80, 1, 163-184

Newman, B., Cosgrove, M., Forret, M. (1988). Being cool in the cool unit or evaluating the learning of refrigeration from scratch. Research in Science Education 18, 220-226

Norris, S.P. (1985). The philosophical basis of observation in science and science education. Journal of Research in Science Teaching 22, 9, 817-833

Novak, J.D. (1980). Learning theory applied to the biology classroom. The American Biology Teacher 42, 5, 280-285

Novak, J.D. (1981). Applying learning psychology and philosophy of science to biology teaching. The American Biology Teacher 43, 1, 12-20

Novak, J.D. (1988). Learning science and the science of learning. Studies in Science Education 15, 77-101

Nurrenbern, S.C., Pickering, M. (1987). Concept learning versus problem solving: is there a difference ? Journal of Chemical Education 64, 6, 508-510

Okeke, E.A.C. (1980). A study of the understanding of transport mechanisms among Nigerian school certificate biology candidates. In: Archenhold, W.F., Driver, R., Orton, A., Wood-Robinson, C.: Cognitive development research in science and mathematics. Proceedings of an international seminar. Leeds: University of Leeds, 216-227

Oldham, V. (1982). Interpretations of difficulty in High School biology. Alberta: University of Alberta, Department of Secondary Education

Oldham, V. (1990). A constructivist approach to teaching plant nutrition: a report on the scheme in action. Leeds: University of Leeds

Olivieri, G., Torosantucci, G., Vincentini, M. (1988). Coloured shadows. International Journal of Science Education 10, 5, 561-569

Olney, D.J. (1988). Some analogies for teaching rates and equilibrium. Journal of Chemical Education 65, 8, 696-697

Olson, J.K., Reid, W.A. (1982). Studying innovation in science teaching: The use of repertory grid techniques in developng a research strategy. European Journal of Science Education 4, 2, 193-201

Omasth, E., Lunetta, V.N. (1988). A strategy for teaching physics concepts and problem-solving. Science Education 72, 5, 625-636

Orton, A. (1985). Studies in mechanics learning. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Osborne, J., Black, P., Smith, M., Meadows, J. (1989). Light. Liverpool: University Press

Osborne, R. (1980). Electric current. LISP working paper 25. Hamilton, N.Z.: University of Waikato

Osborne, R. (1980). Force. LISP working paper 16. Hamilton, N.Z.: University of Waikato

Osborne, R. (1981). Teaching about force. LISP working paper 34. Hamilton, N.Z.: University of Waikato

Osborne, R. (1981). The framework: Toward action research. LISP working paper 28. Hamilton, N.Z.: University of Waikato

Osborne, R. (1982). Conceptual change - for pupils and teachers. Research in Science Education 12, 25-31

Osborne, R. (1984). Children's science meets scientists' science. Lab talk 28, 1, 2-7

Osborne, R., Bell, B.F., Gilbert, J.K. (1983). Science teaching and children's views of the world. European Journal of Science Education 5, 1, 1-14

Osborne, R., Freyberg, P. (1985). Children's science. In: Osborne, R., Freyberg, P.: Learning in science. The implications of children's science. Auckland, London, Portsmouth: Heinemann, 5-14

Osborne, R., Freyberg, P., Tasker, R. (1979). Focus on experiments. LISP working paper 2. Hamilton, N.Z.: University of Waikato

Osborne, R., Freyberg, P., Tasker, R. (1979). Focus on topics. LISP working paper 4. Hamilton, N.Z.: University of Waikato

Osborne, R., Freyberg, P., Tasker, R., Stead, K. (1981). Description, analysis and action: three phases of a research project. Research in Science Education 11, 52-58

Osborne, R., Schollum, B., Hill, G. (1981). Force, friction, gravity: notes for teachers. LISP working paper 33. Hamilton, N.Z.: University of Waikato

Osborne, R., Stead, K. (1981). What is gravity ? Some children's ideas. New Zealand Science Teacher 30, 5-12

Osborne, R., Tasker, R., Stead, K. (1979). A visit to a classroom. LISP working paper 13. Hamilton, N.Z.: University of Waikato

Osborne, R., Wittrock, M. (1985). The generative learning model and its implications for science education. Studies in Science Education 12, 59-87

Pascoe, H.T. (1982). Pupils' learning problems in certificate biology. Course proceedings, National Inservice Course. Aberdeen: Aberdeen College of Education, Biology Department

Paterson, D. (1990). Beastly images of childhood. New Scientist

Penny, M., Chennell, F. (1986). Science practicals: What do pupils think ? European Journal of Science Education 8, 3, 325-336

Pines, A.L., Leith, S. (1981). What is concept learning in science ? Theory, recent research and some teaching suggestions. The Australian Science Teachers Journal 27, 3, 15-20

Pontecorvo, C. (1983). Children's science, children's thinking: What is it about ? In: Hahary, D.E., Vincentini, M.: Proceedings of the US-Italy Joint Seminar on Science Education for Elementary School Children, Frascati (Italy). Washington, D.C.: American University, 11-19

Pope, M. (1980). Personal construct theory and current issues in education. Osnabrück: University of Osnabrück

Pope, M. (1980). Practical considerations in the use of repertory grid techniques. Paper presented at "What is the Repertory Grid ?" Workshop, Brunel University Management Programme

Pope, M. (1981). The true spirit: Constructive alternativism in educational research. Paper presented to the 4th International Congress on Personal Construct Psychology, Brock University, St.Catharines (Canada)

Pope, M., Gilbert, J. (1983). Explanation and metaphor: Some empirical questions in science education. European Journal of Science Education 5, 3, 249-261

Pope, M., Gilbert, J. (1985). Theories of learning: Kelly. In: Osborne, R., Gilbert, J.: Some issues of theory in science education. Hamilton, N.Z.: University of Waikato, 19-41

Pope, M., Scott, E.M. (1983). Teachers' epistemology and practice. Paper presented at ISATT symposium, Netherlands

Posner, G. (1978). Tools for curriculum research and development: Potential contributions from cognitive science. Curriculum Inquiry 8, 4, 311-340

Posner, G. (1982). A cognitive science conception of curriculum and instruction. Journal of Curriculum Studies 14, 4, 343-351

Posner, G., Hoagland, G. (1981). Development of an instrument for assessing students' beliefs about science. Paper presented at the annual convocation of the North Eastern Educational Research Association, New York

Powell, C.B., Powell, R.A. (1982). The predator-prey concept in elementary education. Wildlife Society Bulletin 10, 238-244

Power, C. (1982). Science education, cognitive developmental research and theory in the U.K.. Research in Science Education 12, 1-8

Powney, J., Watts, M. (1984). Reporting interviews: A code of good practice. Research Intelligence 17, 2-6

Prosser, M. (1985). Describing the effects of prior student cognitive structure and study strategy on achievement in a first year University physics course. Sydney: University of Sydney, Centre for Teaching and Learning

Psillos, D., Koumaras, P., Valassiades, O. (1987). Pupils' representations of electric current before, during and after instruction on DC circuits. Research in Science and Technological Education 5, 2, 185-200

Ramadas, J. (1982). Use of ray diagrams in optics. School Science 20, 10, 1-8

Ramadas, J., Driver, R. (1988). Aspects of secondary students' understanding of light. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Redecker, B. (1984). The difference between the lifeworld of children and the world of physics: A basic problem for teaching and learning mechanics. In: Lijnse, P.: The many faces of teaching and learning mechanics in secondary and early tertiary education: Proceedings of a conference on physics education. Utrecht: GIREP/SVO/UNESCO, 77-95

Roberts, W., Sutton, C.R. (1984). Adults' recollections from school chemistry - facts, principles and meaning. Education in Chemistry 21, 3, 82-85

Robinson, E.J., Robinson, W.P. (1982). Knowing when you don't know enough: Children's judgements about ambiguous information. Cognition 12, 267-280

Robinson, E.J., Whittaker, S.J. (1986). Children's conceptions of meaning - message relationships. Cognition 22, 1, 41-60

Ross, K.A. (1987). Concept profiles for matter-energy-sun-fuel-food. A cross-cultural study of people's understanding of the functioning of fuels and the process of burning. Cheltenham: The College of St.Paul & St.Mary, School of Mathematics Science & Computing

Rowe, J.H., Chiappetta, E.L., Summers, C.T. (1981). The effects of relating personal experiences through narratives and prompting on the recall of physical science concepts. Paper presented to the 84th annual meeting of the Texas Academy of Science, University of Texas

Rowell, J.A. (1982). Images of science: An empirical study. European Journal of Science Education 4, 1, 79-94

Rowell, J.A. (1984). Many paths to knowledge: Piaget and science education. Studies in Science Education 11, 1-25

Rowell, J.A. (1989). Piagetian epistemology: equilibration and the teaching of science. Synthese 80, 1, 141-162

Rowell, J.A., Dawson, C. (1979). Cognitive conflict: its nature and use in the teaching of science. Research in Science Education 9, 169-175

Rowell, J.A., Dawson, C. (1981). Volume, conservation and instruction. A classroom-based Solomon Four group study of conflict. Journal of Research in Science Teaching 18, 6, 533-546

Rowell, J.A., Dawson, C.J. (1979). Skill integration, Piaget and education. Studies in Science Education 6, 45-68

Rowell, J.A., Dawson, C.J. (1980). Mountain ore molehill: Can cognitive psychology reduce the dimensions of conceptual problems in classroom practice ? Studies in Science Education 64, 5, 693-708

Rowell, J.A., Dawson, C.J. (1983). Laboratory counter examples and the growth of understanding in science. European Journal of Science Education 5, 2, 203-215

Rubba, P., Andersen, H. (1978). Development of an instrument to assess secondary students' understanding of the nature of scientific knowledge. Science Education 62, 4, 449-458

Rudnitsky, A.N., Hunt, C.R. (1986). Children's strategies for discovering cause-effect relationships. Journal of Research in Science Teaching 23, 5, 451-464

Russell, T., Watt, D. (1989). Evaporation and condensation. Primary SPACE Programme Research Report. Liverpool: Liverpool University Press

Russell, T., Watt, D. (1989). Growth. Primary SPACE Programme Research Report. Liverpool: Liverpool University Press

Russell, T., Watt, D. (1989). Sound. Primary SPACE Programme Research Report. Liverpool: Liverpool University Press

Russell, T.J. (1980). Children's understanding of simple electrical circuits. In: Russell, T.J., Sia, A.P.C.: Science and mathematics, concept learning of South East Asian children: Second report of phase II. Glugor, Malaysia: SEAMEO-RECSAM, 67-91

Russell, T.L. (1983). Analyzing arguments in science classroom discourse: Can teachers' questions distort scientific authority ? Journal of Research in Science Teaching 20, 1, 27-45

Saklofske, D., Kelly, I. (1980). Pictures and reading: a review of the research literature. Reading Education 5, 2, 5-10

Schibeci, R.A. (1986). Images of science and scientists and science education. Science Education 70, 2, 139-149

Schoenberger, M., Russell, T. (1986). Elementary science as a little added frill: a report of two case studies. Science Education 70, 5, 519-538

Schollum, B. (1980). Burning. A resource unit for teachers. LISP working paper 36. Hamilton, N.Z.: University of Waikato

Schollum, B. (1980). Chemical change. LISP working paper 27. Hamilton, N.Z.: University of Waikato

Schollum, B. (1980). Reactions. A resource unit for teachers. LISP working paper 37. Hamilton, N.Z.: University of Waikato

Schollum, B. (1988). Helping students learn in chemistry. Research in Science Education 18, 283-289

Schollum, B., Hill, G., Osborne, R. (1981). Teaching about force. LISP working paper 34. Hamilton, N.Z.: University of Waikato

Schollum, B., Osborne, R., Lambert, J. (1981). Heating and cooling: A resource unit for teachers. LISP working paper 38. Hamilton, N.Z.: University of Waikato

Schon, D.A. (1981). Intuitive thinking ? A metaphor underlying some ideas of educational reform. Cambridge, Mass.: Division for Study and Research in Education. Massachusetts Institute of Technology

Schuster, D.G. (1981). Qualitative physics problems. Paper presented at the national meeting of the American Association of Physics Teachers, New York

Scott, P., Dyson, T., Gater, S. (1987). A constructivist view of learning and teaching in science. Leeds: University of Leeds, Centre for Studies in Science and Mathematics Education

Searle, P., Gunstone, R. (1990). Conceptual change and physics instruction: a logitudinal study. Paper presented at the annual meeting of the American Educational Research Association, Boston MA

Sedgwick, P.P., Linke, R.D., Lucas, A.M. (1978). A comparison of changes in children's concept of life with the development of relevant criteria in Australian science curriculum materials. Research in Science Education 8, 185-203

Selley, N.J. (1978). The confusion of molecular particles with substances. Education in Chemistry 15, 5, 144-145

Selley, N.J. (1981). The place of alternative models in school science. School Science Review 63, 223, 252-259

Selman, R.L., Krupa, M.P., Stone, C.R., Jaquette, D.S. (1982). Concrete operational thought and the emergence of the concept of unseen force in children's theories of electromagnetism and gravity. Science Education 66, 2, 181-194

Sequeira, M., Freitas, M. (1986). "Death" and "decomposition" of living organisms: Children's alternative frameworks. Paper presented at the 11th Conference of the Association for Teacher Education in Europe (ATEE), Toulouse (France)

Sequeira, M., Freitas, M., Leite, L. (1985). The use of concept mapping with elementary school children. Paper presented at the symposium: The Implications of Cognitive Science for the Education of Science Teachers, IPN Kiel (Germany)

Sere, M.G. (1986). Children's conceptions of the gaseous state, prior to teaching. European Journal of Science Education 8, 4, 413-425

Shayer, M. (1982). Cognitive acceleration and science education. In: Head, J.: Science education for the citizen: Proceedings of the UK-USA Seminar. London: University of London, Chelsea College, 37-47

Shemesh, M., Lazarowitz, R. (1989). Pupils' reasoning skills and their mastery of biological concepts. Journal of Biological Education 23, 1, 59-63

Siegler, R.S. (1978). The origins of scientific reasoning. In: Siegler, R.S.: Children's thinking: What develops ? Hillsdale, N.J.: Erlbaum Associates, 109-149

Simon, D.P., Simon, H.A. (1978). Individual differences in solving physics problems. In: Siegler, R.S.: Children's thinking: What develops ? Hillsdale, N.J.: Erlbaum Associates

Simpson, M. (1983). The molecell rules, o.k. ? Aberdeen College of Education Biology Newsletter 43, Nov, 7-11

Simpson, M. (1984). Digestion - the long grind. Aberdeen College of Education Biology Newsletter 44, May, 12-16

Simpson, M. (1984). Teaching about digestion and getting the system to work. Aberdeen College of Education Biology Newsletter 44, Nov, 15-22

Simpson, M. (1985). Educational research - shedding light on learning problems. Aberdeen College of Education Biology Newsletter 46, 24-27

Simpson, M. (1985). So you think you can teach osmosis ? Paper presented at a UEA course for Swedish university lectureres on "The scientist's thinking tools". Norwich (England), University of East Anglia

Simpson, M., Arnold, B. (1979). The concept of photosynthesis at "O" grade - What are the pupil difficulties. Scottish Association for Biological Education Newsletter 4, 38-40

Simpson, M., Arnold, B. (1982). The concept of osmosis at "O" grade - First, let's concentrate on diluting water. Aberdeen College of Education Biology Newsletter 39, May, 38-41

Simpson, M., Arnold, B. (1982). The concept of osmosis at "O" grade. Molecules and membranes - getting it right. Aberdeen College of Education Biology Newsletter 40, Nov, 11-13

Smail, B., Whyte, J. (1982). Girls into science and technology: the first two years. School Science Review 63, 225, 620-630

Smith, D.D. (1979). Rates of reaction - analogies. Journal of Chemical Education 56, 1, 47

Smith, E.L. (1985). Comprehensive analysis of the teaching and learning of science topics: A research programme for science education. Paper presented at the annual meeting of the National Association for Science Teaching

Smith, E.L., Anderson, C.W. (1984). Plants as producers: A case study of elementary science teaching. Journal of Research in Science Teaching 21, 7, 685-698

Smith, E.L., Anderson, C.W. (1984). The planning and teaching intermediate science study: Final report. IRT Research Series 6

Smith, E.L., Loft, G.W. (1983). Teaching for conceptual change: Some ways of going wrong. In: Helm, H., Novak, J.D.: Proceeding of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 57-66

Smith, M.L. (1982). Benefits of naturalistic methods in research in science education. Journal of Research in Science Teaching 19, 8, 627-638

Solomon, J. (1980). Teaching children in the laboratory. London: Croom Helm

Solomon, J. (1983). Messy, contradictory and obstinately persistant: A study of children's out-of-school ideas about energy. School Science Review 65, 231, 225-233

Solomon, J. (1985). Classroom discussion: A method of research for teachers ? British Educational Research Journal 11, 2, 153-162

Solomon, J., Black, D. (1987). Can pupils use taught analogies for electric current ? School Science Review 69, 247, 249-254

Souque, J.P., Desautiels, J. (1979). La course d'obstacles du savior. Quebec Science, Sept, 36-39

Souza-Barros, S.L. de (1985). Spontaneous concepts about light phenomena in children: Qualitative analysis. ICPE conference "Communicating Physics", Duisburg (Germany)

Sparkes, J. (1981). What is this thing called science ? New Scientist 89, 1236, 156-158

Stead, K. (1983). Insights into students' outlooks on science with personal constructs. Research in Science Education 13, 163-176

Stead, K., Osborne, R. (1980). Friction. LISP working paper 19. Hamilton, N.Z.: University of Waikato

Stead, K., Osborne, R. (1980). Gravity. LISP working paper 20. Hamilton, N.Z.: University of Waikato

Stepich, D.A., Newby, T.J. (1988). Analogical instruction within the information processing paradigm: Effective means to facilitate learning. Instructional Science 17, 329-344

Stewart, J., Dale, M. (1989). High Scool students' understanding of chromosome/gene behaviour during meiosis. Science Education 73, 4, 501-521

Stewart, J.H., Atkin, J.A. (1982). Information processing psychology: A promising paradigm for research in science teaching. Journal of Research in Science Teaching 19, 4, 321-332

Strauss, S., Stavy, R. (1982). U-shaped behavioural growth: Implications for theories of development. In: Hartup, W.: Review of child development research volume 6. Chicago: University of Chicago Press

Strauss, S., Stavy, R. (1983). Educational-developmental psychology and curriculum development: The case of heat and temperature. In: Helm, H., Novak, J.D.: Proceedings of the International Seminar "Misconceptions in Science and Mathematics". Ithaca, N.Y.: Cornell University, 292-303

Strike, K., Posner, G. (1982). Epistemological assumptions of College students: An initial report. Paper presented at the 13th Annual Conference of the North Eastern Education Research Association. Ellenville, New York

Strike, K., Posner, G. (1983). On rationality and learning: A reply to West and Pines. Science Education 67, 1, 41-43

Strong, L.E. (1970). Differentiating physical and chemical changes. Journal of Chemical Education 47, 689

Sumfleth, E. (1985). Lernhilfen für den problemlösenden Chemie-Unterricht. chimica didactica 11, 63-88

Summers, M.K. (1982). Science education and meaningful learning. School Science Review 64, 227, 361-367

Summers, M.K. (1983). Teaching heat - an analysis of misconceptions. School Science Review 64, 229, 670-676

Sutton, C. (1981). Public knowledge and private understandings. How can learners recreate within their own understandings the insight gained by others ? Paper presented to the Science Education Conference at Pembroke College, Oxford

Swartz, R. (1982). Alternative learning strategies as part of the educational process. Science Education 66, 2, 269-279

Swift, D.J. (1985). Towards a personal construct pedagogy. Paper presented to the 6th International Congress on Personal Construct Psychology, University of Cambridge

Symington, D., Spurling, H. (1984). The concept of change held by middle primary school children. Malvern, Australia: Victoria College, Faculty of Teacher Education

Taber, K.S. (1989). Energy by many other names. School Science Review 70, 252

Tasker, R. (1980). Some aspects of the students' view of doing science. Research in Science Education 10, 19-22

Terhart, E. (1988). Philosophy of science and school science teaching. International Journal of Science Education 10, 1, 11-16

Test, D.W., Heward, W.L. (1980). Photosynthesis: Teaching a complex science concept to juvenile delinquents. Science Education 64, 2, 129-139

Thomas, M.A. (1989). Cognitive conflict and development: is course demand enough ? International Journal of Science Education 11, 3, 287-296

Thomsen, P. (1980). Teaching oscillations and waves in the Junior High School. In: Ganiel, U.: Physics Teaching: Oscillations and waves - current problems. Proceedings of the GIREP conference held in the Weizman Institute of Science, Israel. Jerusalem: Balaban International Science Services, 493-521

Thomsen, P. (1984). Teaching the concepts of kinetic energy, potential energy and internal energy to 14-15 years old students of mixed ability. In: Lijnse, P.L.: The many faces of teaching and learning mechanics in secondary and early tertiary education. Proceeding of a conference on physics education. Utrecht: GIREP/SVO/UNESCO, 607-624

Tiberghien, A. (1980). Difficulties in concept formation. Paris: Universite Paris

Tiberghien, A. (1986). Research in physics education and teaching materials. Paper presented at the conference "Trends in Physical Education", Tokyo (Japan)

Tripp, D.H. (1985). Case study generalisation: An agenda for action. British Educational Research Journal 11, 1, 33-43

Vosniadou, S., Brewer, W. (1989). The concept of the earth's shape: A study of conceptual change in childhood. Illinois: University of Illinois

Wade, B., Wood, A. (1980). Assessing talk in science. Educational Review 32, 2, 205-214

Ward, C.R., Herron, J.D. (1980). Helping students understand formal chemical concepts. Journal of Research in Science Teaching 17, 5, 387-400

Watson, B., Konicek, R. (1990). Teaching for conceptual change confronting children's experience. Phi Delta Kappa 71, 9, 680-685

Watts, D.M. (1983). Constructing of "conducting" and the conduct of construing the problem of multiple conceptions in-and of-school. Two-part paper presented to AUCET/ADEPT/UBET Conference, University of Warwick

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of physics concepts: An introductory guide. Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of science concepts: "Energy". Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of science concepts: "Force". Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of science concepts: "Gravity". Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of science concepts: "Heat". Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K. (1985). Appraising the understanding of science concepts: "Light". Guildford: University of Surrey, Department of Educational Studies

Watts, D.M., Gilbert, J.K., Pope, M.L. (1982). Alternative frameworks: Representations of schoolchildren's understanding of science. Paper presented to First International Symposium on Representing Understanding, London

Watts, M. (1984). Learners' alternative frameworks of force and motion. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science: The proceedings of a conference. London: SSCR, 73-76

Watts, M. (1984). Learners' alternative frameworks of light. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science: The proceedings of a conference. London: SSCR, 69-72

Watts, M., Bell, B. (1984). A view of learning. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science: The proceedings of a conference. London: SSCR, 23-35

Watts, M., Bentley, D. (1987). Constructivism in the classroom: Enabling conceptual change by words and deeds. British Educational Research Journal 13, 2, 121-135

Weil-Barais, A., Sere, M.G., Landier, J.C. (1986). Evolution des jugements de conservation de quantites de gaz chez des eleves de CM2. European Journal of Psychology of Education 1, 3, 9-30

West, L.H.T. (1985). Concept mapping. Paper presented at the symposium: "Perspectives on cognitive structure and conceptual change", AERA annual meeting in Chicago

West, L.H.T., Fensham, P.J. (1976). Prior knowledge or advance organizers as effective variables in chemical learning. Journal of Research in Science Teaching 13, 4, 297-306

West, R.W., Bentley, D. (1984). Health and science education: Proposals for action and consultation. Secondary Science Curriculum Review, Feb

Wheeler, A.E., Kass, H. (1974). Student misconceptions in chemical equilibrium as related to cognitive level and achievement. Paper presented to the 47th Meeting of the National Association for Research in Science Teaching, Chicago

White, R.T., Gunstone, R.F. (1980). Converting memory protoclos to scores on several dimensions. Paper presented to the meeting of the Australian Association for Research in Education, Sydney

Wicheigren, W.A. (1979). Reading comprehension and semantic memory: Final report. Oregon: Oregon University

Williams, M.D., Hollan, J.D., Stevens, A.L. (1983). Human reasoning about a simple physical system. In: Gentner, D., Stevens, A.L.: Mental models. Hillsdale, N.J.: Lawrence Erlbaum Associates, 131-153

Williams, T., Herman, R., Kenward, M. (1985). What do people think of science ? New Scientist 21, Feb, 12-17

Williamson, P.A. (1981). The effects of methodology and level of development on children's animistic thought. Journal of General Psychology 138, 159-174

Wiser, M. (1989). Conceptual computer models for thermal physics: How high school students come to differentiate between heat and temperature. Paper presented at the annual meeting of the American Educational Research Association, San Francisco

Wood-Robinson, C. (1984). Pupils' visualisation of three-dimensional structures in school science. In: Bell, B., Watts, M., Ellington, K.: Learning, doing and understanding in science: The proceedings of a conference. London: SSCR, 110-122

Woolnough, B. (1985). The uses and abuses of practical work in teaching and learning mechanics. In: Lijnse, P.L.: The many faces of teaching and learning mechanics in secondary and early tertiary education. Proceedings of a conference on physics education. Utrecht: GIREP/SVO/UNESCO, 631-637

Wotring, A.M. (1980). Writing to think about high school chemistry. Virginia: George Mason University, Faculty of Graduate School

Wright, D.S., Williams, C.D. (1986). A WISE strategy for intruducing physics. The Physics Teacher 24, 4, 211-216

Zeitoun, H.H. (1989). The relationship between abstract concept achievement and prior knowledge, formal reasoning and gender. International Journal of Science Education 11, 2, 227-234

Liste aller Schlagwörter I / List of keywords I

	Schlagwörter für die Einteilung in Gruppen	Keywords for assigning to groups
g1	Zum Umfeld des Problems Vorstellungen der Schüler	General considerations concerning research in this area
g2	Alltagsvorstellungen und wissenschaftliche Vorstellungen	Everyday notions and scientific notions
g3	Geschichtliche und individuelle Entwicklung von Vorstellungen	Development of notions in the history of science as compared to development of notions in individuals
g4	Sprache und Vorstellungen	Language and notions
g5	Methoden zur Erfassung von Vorstellungen	Methods to investigate notions
g6	Untersuchungen zu Vorstellungen (von Schülern)	Investigations of (students') notions
g7	Unterricht unter Berücksichtigung von Vorstellungen	Instruction taking students' notions into account
g8	Untersuchungen zu Vorstellungen von Lehrern	Investigations of teachers' notions
g9	Vorstellungen und Lehrerbildung	Notions and teacher training

Liste aller Schlagwörter II / List of keywords II

	Weitere Schlagwörter für die Gruppen g6, g7 und g8	Further keywords for groups g6, g7 and g8
B C P	Biologie Chemie Physik	biology chemistry physics
AT AS E EN ENT FLD INF IRR MAG M O Q R S STAT T	- Atome und Teilchen - Astronomie - Elektrizität - Energie - Entropie - Feld - Information - Irreversibilität - Magnetismus - Mechanik - Optik - Quantenphysik - Relativistische Physik - Schall - Statistische Physik - Wärme (Therm. Physik)	- atoms and particles - astronomy - electricity - energy - entropy - field - information - irreversibility - magnetism - mechanics - optics - quantum physics - relativistic physics - sound - statistical physics - heat (thermal physics)
CTL CSC STS	- Vorstellungen des Lehr-, Lernprozesses - Vorstellungen zur "Natur" der Wissenschaften - Vorstellungen zum Nutzen naturwissenschaftlicher Kenntnisse in Technik und Gesellschaft	- conceptions of teaching/learning - conceptions of science - conceptions of the use of science for technology and society
GEN	- Geschlechtsspezifische Unterschiede werden untersucht	- gender differences are investigated
OCI	- Der Beitrag enthält Originalzitate aus Interviews, Fragebögen und dergleichen	- The article contains orinal quotations from interviews, questionnaires and the like
OIM	- Der Beitrag enthält Originalzeichnungen der Befragten	- The article contains orinal drawings of students or teachers

The IPN is a national centre of interdisciplinary research, development and teaching in the field of science teaching in all educational areas.

The institute consists of the following departments: Biology Education, Chemistry Education, Physics Education, Educational Science, Educational and Psychological Methodology (including data processing) and the Administration and General Services Department.

It is financed in accordance with an agreement made by the federation and the federal states for the promotion of research.

Das IPN ist ein überregionales Zentrum für die interdisziplinäre Forschung, Entwicklung und Lehre im Bereich des naturwissenschaftlichen Unterrichts in allen Bildungsbereichen.

Das Institut gliedert sich in die Abteilungen Didaktik der Biologie, Didaktik der Chemie, Didaktik der Physik, Erziehungswissenschaften, Pädagogisch-Psychologische Methodenlehre (einschließlich Datenverarbeitung) und die Zentralabteilung. Es wird im Rahmen der Vereinbarung des Bundes und der Länder zur gemeinsamen Forschungsförderung finanziert.